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THE PHILOSOPHICAL IMPORTANCE OF MATHEMATICAL LOGIC.[1]

IN speaking of "mathematical logic," I use this word in a very broad sense. By it I understand the works of Cantor on transfinite numbers as well as the logical work of Frege and Peano. Weierstrass and his successors have "arithmetized" mathematics; that is to say, they have reduced the whole of analysis to the study of integer numbers. The accomplishment of this reduction indicated the completion of a very important stage, at the end of which the spirit of dissection might well be allowed a short rest. However, the theory of integer numbers cannot be constituted in an autonomous manner, especially when we take into account the likeness in properties of the finite and infinite numbers. It was, then, necessary to go farther and reduce arithmetic, and above all the definition of numbers, to logic. By the name "mathematical logic," then, I will denote any logical theory whose object is the analysis and deduction of arithmetic and geometry by means of concepts which belong evidently to logic. It is this modern tendency that I intend to discuss here.

In an examination of the work done by mathematical logic, we may consider either the mathematical results,

[1] [Lecture delivered in French at the School of advanced social studies (Ecole des Hautes Etudes Sociales) on March 22, 1911; translated by P. E. B. Jourdain from the *Revue de Métaphysique et de Morale*, Vol. XX, 1912, where it appears under the title, "L'Importance philosophique de la Logistique." This translation has been most kindly revised by Mr. Russell. The translator has added a few references in square brackets.]

the method of mathematical reasoning as revealed by modern work, or the intrinsic nature of mathematical propositions according to the analysis which mathematical logic makes of them. It is impossible to distinguish exactly these three aspects of the subject, but there is enough of a distinction to serve the purpose of a framework for discussion. It might be thought that the inverse order would be the best; that we ought first to consider what a mathematical proposition is, then the method by which such propositions are demonstrated, and finally the results to which this method leads us. But the problem which we have to resolve, like every truly philosophical problem, is a problem of analysis; and in problems of analysis the best method is that which sets out from results and arrives at the premises. In mathematical logic it is the conclusions which have the greatest degree of certainty: the nearer we get to the ultimate premises the more uncertainty and difficulty do we find.[2]

From the philosophical point of view, the most brilliant results of the new method are the exact theories which we have been able to form about infinity and continuity. We know that when we have to do with infinite collections, for example the collection of finite integer numbers, it is possible to establish a one-to-one correspondence between the whole collection and a part of itself. For example, there is such a correspondence between the finite integers and the even numbers, since the relation of a finite number to its double is one-to-one. Thus it is evident that the number of an infinite collection is equal to the number of a part of this collection. It was formerly believed that this was a contradiction; even Leibniz, although he was a partisan of the actual infinite, denied infinite *number* because of this supposed contradiction. But to demonstrate that there is

[2] [Cf. A. N. Whitehead and B. Russell, *Principia Mathematica*, Vol. I, Cambridge, 1910, pp. v-vi.—Tr.]

a contradiction we must suppose that all numbers obey mathematical induction. To explain mathematical induction, let us call by the name "hereditary property" of a number a property which belongs to $n+1$ whenever it belongs to n. Such is, for example, the property of being greater than 100. If a number is greater than 100, the next number after it is greater than 100. Let us call by the name "inductive property" of a number a hereditary property which is possessed by the number zero. Such a property must belong to 1, since it is hereditary and belongs to 0; in the same way, it must belong to 2, since it belongs to 1; and so on. Consequently the numbers of daily life possess every inductive property. Now, amongst the inductive properties of numbers is found the following. If any collection has the number n, no part of this collection can have the same number n. Consequently, if all numbers possess all inductive properties, there is a contradiction with the result that there are collections which have the same number as a part of themselves. This contradiction, however, ceases to subsist as soon as we admit that there are numbers which do not possess all inductive properties. And then it appears that there is no contradiction in infinite number. Cantor has even created a whole arithmetic of infinite numbers, and by means of this arithmetic he has completely resolved the former problems on the nature of the infinite which have disturbed philosophy since ancient times.

The problems of the *continuum* are closely connected with the problems of the infinite and their solution is effected by the same means. The paradoxes of Zeno the Eleatic and the difficulties in the analysis of space, of time, and of motion, are all completely explained by means of the modern theory of continuity. This is because a non-contradictory theory has been found, according to which the continuum is composed of an infinity of distinct ele-

ments; and this formerly appeared impossible. The elements cannot all be reached by continual dichotomy; but it does not follow that these elements do not exist.

From this follows a complete revolution in the philosophy of space and time. The realist theories which were believed to be contradictory are so no longer, and the idealist theories have lost any excuse there might have been for their existence. The flux, which was believed to be incapable of analysis into indivisible elements, shows itself to be capable of mathematical analysis, and our reason shows itself to be capable of giving an explanation of the physical world and of the sensible world without supposing jumps where there is continuity, and also without giving up the analysis into separate and indivisible elements.

The mathematical theory of motion and other continuous changes uses, besides the theories of infinite number and of the nature of the continuum, two correlative notions, that of a *function* and that of a *variable*. The importance of these ideas may be shown by an example. We still find in books of philosophy a statement of the law of causality in the form: "When the same cause happens again, the same effect will also happen." But it might be very justly remarked that the same cause never happens again. What actually takes place is that there is a constant relation between causes of a certain kind and the effects which result from them. Wherever there is such a constant relation, the effect is a function of the cause. By means of the constant relation we sum up in a single formula an infinity of causes and effects, and we avoid the worn-out hypothesis of the *repetition* of the same cause. It is the idea of functionality, that is to say the idea of constant relation, which gives the secret of the power of mathematics to deal simultaneously with an infinity of data.

To understand the part played by the idea of a function in mathematics, we must first of all understand the method of mathematical deduction. It will be admitted that mathematical demonstrations, even those which are performed by what is called mathematical induction, are always deductive. Now, in a deduction it almost always happens that the validity of the deduction does not depend on the subject spoken about, but only on the form of what is said about it. Take for example the classical argument: All men are mortal, Socrates is a man, therefore Socrates is mortal. Here it is evident that what is said remains true if Plato or Aristotle or anybody else is substituted for Socrates. We can, then, say: If all men are mortal, and if x is a man, then x is mortal. This is a first generalization of the proposition from which we set out. But it is easy to go farther. In the deduction which has been stated, nothing depends on the fact that it is men and mortals which occupy our attention. If all the members of any class α are members of a class β, and if x is a member of the class α, then x is a member of the class β. In this statement, we have the pure logical form which underlies all the deductions of the same form as that which proves that Socrates is mortal. To obtain a proposition of pure mathematics (or of mathematical logic, which is the same thing), we must submit a deduction of any kind to a process analogous to that which we have just performed, that is to say, when an argument remains valid if one of its terms is changed, this term must be replaced by a variable, i. e., by an indeterminate object. In this way we finally reach a proposition of pure logic, that is to say a proposition which does not contain any other constant than logical constants. The definition of the *logical constants* is not easy, but this much may be said: A *constant* is *logical* if the propositions in which it is found still contain it when we try to replace it by a variable.

More exactly, we may perhaps characterize the logical constants in the following manner: If we take any deduction and replace its terms by variables, it will happen, after a certain number of stages, that the constants which still remain in the deduction belong to a certain group, and, if we try to push generalization still farther, there will always remain constants which belong to this same group. This group is the group of logical constants. The logical constants are those which constitute pure form; a formal proposition is a proposition which does not contain any other constants than logical constants. We have just reduced the deduction which proves that Socrates is mortal to the following form: "If x is an α, then, if all the members of α are members of β, it follows that x is a β." The constants here are: *is-a, all,* and *if-then.* These are logical constants and evidently they are purely formal concepts.

Now, the validity of any valid deduction depends on its form, and its form is obtained by replacing the terms of the deduction by variables, until there do not remain any other constants than those of logic. And conversely: every valid deduction can be obtained by starting from a deduction which operates on variables by means of logical constants, by attributing to variables definite values with which the hypothesis becomes true.

By means of this operation of generalization, we separate the strictly deductive element in an argument from the element which depends on the particularity of what is spoken about. Pure mathematics concerns itself exclusively with the deductive element. We obtain propositions of pure mathematics by a process of *purification.* If I say: "Here are two things, and here are two other things, therefore here are four things in all," I do not state a proposition of pure mathematics because here particular data come into question. The proposition that I have stated is an *application* of the general proposition: "Given

any two things and also any two other things, there are four things in all." The latter proposition is a proposition of pure mathematics, while the former is a proposition of applied mathematics.

It is obvious that what depends on the particularity of the subject is the verification of the hypothesis, and this permits us to assert, not merely that the hypothesis implies the thesis, but that, since the hypothesis is true, the thesis is true also. This assertion is not made in pure mathematics. Here we content ourselves with the hypothetical form: *If* any subject satisfies such and such a hypothesis, it will also satisfy such and such a thesis. It is thus that pure mathematics becomes entirely hypothetical, and concerns itself exclusively with any indeterminate subject, that is to say with a *variable*. Any valid deduction finds its form in a hypothetical proposition belonging to pure mathematics; but in pure mathematics itself we affirm neither the hypothesis nor the thesis, unless both can be expressed in terms of logical constants.

If it is asked why it is worth while to reduce deductions to such a form, I reply that there are two associated reasons for this. In the first place, it is a good thing to generalize any truth as much as possible; and, in the second place, an economy of work is brought about by making the deduction with an indeterminate x. When we reason about Socrates, we obtain results which apply only to Socrates, so that, if we wish to know something about Plato, we have to perform the reasoning all over again. But when we operate on x, we obtain results which we know to be valid for every x which satisfies the hypothesis. The usual scientific motives of economy and generalization lead us, then, to the theory of mathematical method which has just been sketched.

After what has just been said it is easy to see what must be thought about the intrinsic nature of propositions

of pure mathematics. In pure mathematics we have never to discuss facts that are applicable to such and such an individual object; we need never know anything about the actual world. We are concerned exclusively with variables, that is to say, with any subject, about which hypotheses are made which may be fulfilled sometimes, but whose verification for such and such an object is only necessary for the *importance* of the deductions, and not for their truth. At first sight it might appear that everything would be arbitrary in such a science. But this is not so. It is necessary that the hypothesis *truly* implies the thesis. If we make the hypothesis that the hypothesis implies the thesis, we can only make deductions in the case when this new hypothesis truly implies the new thesis. Implication is a logical constant and cannot be dispensed with. Consequently we need *true* propositions about implication. If we took as premises propositions on implication which were not true, the consequences which would appear to flow from them would not be truly implied by the premises, so that we would not obtain even a hypothetical proof. This necessity for *true* premises emphasizes a distinction of the first importance, that is to say the distinction between a premise and a hypothesis. When we say "Socrates is a man, *therefore* Socrates is mortal," the proposition "Socrates is a man" is a *premise*; but when we say: *"If* Socrates is a man, *then* Socrates is mortal," the proposition "Socrates is a man" is only a hypothesis. Similarly when I say: "If from p we deduce q and from q we deduce r, then from p we deduce r," the proposition "From p we deduce q and from q we deduce r" is a hypothesis, but the whole proposition is not a hypothesis, since I affirm it, and, in fact, it is true. This proposition is a rule of deduction, and the rules of deduction have a twofold use in mathematics: both as premises and as a method of obtaining consequences of the premises. Now, if the rules of deduc-

tion were not true, the consequences that would be obtained by using them would not truly be consequences, so that we should not have even a correct deduction setting out from a false premise. It is this twofold use of the rules of deduction which differentiates the foundations of mathematics from the later parts. In the later parts, we use the same rules of deduction to deduce, but we no longer use them immediately as premises. Consequently, in the later parts, the immediate premises may be false without the deductions being logically incorrect, but, in the foundations, the deductions will be incorrect if the premises are not true. It is necessary to be clear about this point, for otherwise the part of arbitrariness and of hypothesis might appear greater than it is in reality.

Mathematics, therefore, is wholly composed of propositions which only contain variables and logical constants, that is to say, purely formal propositions—for the logical constants are those which constitute form. It is remarkable that we have the power of knowing such propositions. The consequences of the analysis of mathematical knowledge are not without interest for the theory of knowledge. In the first place it is to be remarked, in opposition to empirical theories, that mathematical knowledge needs premises which are not based on the data of sense. Every general proposition goes beyond the limits of knowledge obtained through the senses, which is wholly restricted to what is individual. If we say that the extension of the given case to the general is effected by means of induction, we are forced to admit that induction itself is not proved by means of experience.[3] Whatever may be the exact formulation of the fundamental principle of induction, it is evident that in the first place this principle is general, and

[3] [On induction and the principle of induction, cf. also B. Russell, *The Problems of Philosophy*, London and New York, 1912, pp. 93-108—Tr.]

in the second place that it cannot, without a vicious circle, be itself demonstrated by induction.

It is to be supposed that the principle of induction can be formulated more or less in the following way. If we are given the fact that any two properties occur together in a certain number of cases, it is more probable that a new case which possesses one of these properties will possess the other than it would be if we had not such a datum. I do not say that this is a satisfactory formulation of the principle of induction; I only say that the principle of induction must be like this in so far as it must be an absolutely general principle which contains the notion of probability. Now it is evident that sense-experience cannot demonstrate such a principle, and cannot even make it probable; for it is only in virtue of the principle itself that the fact that it has often been successful gives grounds for the belief that it will probably be successful in the future. Hence inductive knowledge, like all knowledge which is obtained by reasoning, needs logical principles which are *a priori* and universal. By formulating the principle of induction, we transform every induction into a deduction; induction is nothing else than a deduction which uses a certain premise, namely the principle of induction.

In so far as it is primitive and undemonstrated, human knowledge is thus divided into two kinds: knowledge of particular facts, which alone allows us to affirm existence, and knowledge of logical truth, which alone allows us to reason about data. In science and in daily life the two kinds of knowledge are intermixed: the propositions which are affirmed are obtained from particular premises by means of logical principles. In pure perception we only find knowledge of logical truths. In order that such a knowledge be possible, it is necessary that there should be self-evident logical truths, that is to say, truths which are known without demonstration. These are the truths

which are the premises of pure mathematics as well as of the deductive elements in every demonstration on any subject whatever.

It is, then, possible to make assertions, not only about cases which we have been able to observe, but about all actual or possible cases. The existence of assertions of this kind and their necessity for almost all pieces of knowledge which are said to be founded on experience shows that traditional empiricism is in error and that there is *a priori* and universal knowledge.

In spite of the fact that traditional empiricism is mistaken in its theory of knowledge, it must not be supposed that idealism is right. Idealism—at least every theory of knowledge which is derived from Kant—assumes that the universality of *a priori* truths comes from their property of expressing properties of the mind:[4] things appear to be thus because the nature of the appearance depends on the subject in the same way that, if we have blue spectacles, everything appears to be blue. The categories of Kant are the colored spectacles of the mind; truths *a priori* are the false appearances produces by those spectacles. Besides, we must know that everybody has spectacles of the same kind and that the color of the spectacles never changes. Kant did not deign to tell us how he knew this.

As soon as we take into account the consequences of Kant's hypothesis, it becomes evident that general and *a priori* truths must have the same objectivity, the same independence of the mind, that the particular facts of the physical world possess. In fact, if general truths only express psychological facts, we could not know that they would be constant from moment to moment or from person to person, and we could never use them legitimately to deduce a fact from another fact, since they would not

[4] It is possible that the true interpretation of Kant is less psychological than I supposed here; but the historical question has only a secondary importance for us in the present discussion. [Cf. also *ibid.*, pp. 127-141.—Tr.]

connect facts but our ideas about the facts. Logic and mathematics force us, then, to admit a kind of realism in the scholastic sense, that is to say, to admit that there is a world of universals and of truths which do not bear directly on such and such a particular existence. This world of universals must *subsist*, although it cannot *exist* in the same sense as that in which particular data exist.[5] We have immediate knowledge of an indefinite number of propositions about universals: this is an ultimate fact, as ultimate as sensation is. Pure mathematics — which is usually called "logic" in its elementary parts— is the sum of everything that we can know, whether directly or by demonstration, about certain universals.

On the subject of self-evident truths it is necessary to avoid a misunderstanding. Self-evidence is a psychological property and is therefore subjective and variable. It is essential to knowledge, since all knowledge must be either self-evident or deduced from self-evident knowledge. But the order of knowledge which is obtained by starting from what is self-evident is not the same thing as the order of logical deduction, and we must not suppose that when we give such and such premises for a deductive system, we are of opinion that these premises constitute what is self-evident in the system. In the first place self-evidence has degrees: It is quite possible that the consequences are more evident than the premises. In the second place it may happen that we are certain of the truth of many of the consequences, but that the premises only appear probable, and that their probability is due to the fact that true consequences flow from them. In such a case, what we can be certain of is that the premises imply all the true consequences that it was wished to place in the deductive system. This remark has an application to the foundations of mathematics, since many of the ultimate premises are

[5] [Cf. *ibid.*, pp 142-157.—Tr.]

intrinsically less evident than many of the consequences which are deduced from them. Besides, if we lay too much stress on the self-evidence of the premises of a deductive system, we may be led to mistake the part played by intuition (not spatial but logical) in mathematics. The question of the part of logical intuition is a psychological question and it is not necessary, when constructing a deductive system, to have an opinion on it.

To sum up, we have seen, in the first place, that mathematical logic has resolved the problems of infinity and continuity, and that it has made possible a solid philosophy of space, time, and motion. In the second place, we have seen that pure mathematics can be defined as the class of propositions which are expressed exclusively in terms of variables and logical constants, that is to say as the class of purely formal propositions. In the third place, we have seen that the possibility of mathematical knowledge refutes both empiricism and idealism,[6] since it shows that human knowledge is not wholly deduced from facts of sense, but that *a priori* knowledge can by no means be explained in a subjective or psychological manner.

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[6] [Cf. *ibid.*, pp. 58-71.—Tr.]

CHRISTIAN ELEMENTS IN THE BHAGAVADGITA.*

NO other work of Sanskrit literature is so well known and so highly valued in India and the Occident as the Bhagavadgîtâ (Mbh., VI, 830 ff.), "The Song of the Exalted One," i. e., the solemn discourse of Krishna. Originally a text-book of the Bhâgavata sect, the Bhagavadgîtâ in time attained such a significance for all Brahman India that it has become the sum of all wisdom to the cultured Indian. In his contact with Christians he falls back on it as an authority against the New Testament, whose fundamental doctrines he believes to be contained in the Bhagavadgîtâ which in Hindu opinion is much the older. On the other hand European scholars have thought that no other Indian work bears such abundant evidence of Christian influence as the Bhagavadgîtâ. For these reasons I cannot limit myself simply to mention and discuss the points which have given rise to such statements. An exposition of the relations between Christianity and Brahmanism with reference to the history of religion requires a connected summary of the contents of the Bhagavadgîtâ[1] even though I must state most posi-

* Authorized translation from the German manuscript by Lydia G. Robinson. In the bibliographical references the following abbreviations will be observed: ERE, *Encyclopaedia of Religion and Ethics*; IA, *Indian Antiquary*; JAOS, *Journal of the American Oriental Society*; JRAS, *Journal of the Royal Asiatic Society*.

[1] I may be allowed to use for this purpose extracts from the exhaustive introduction to my translation of the Bhagavadgîtâ (Leipsic, 1905).

tively that the oft asserted dependence of the Indian poem upon the New Testament is only an apparent one.

After a feud of many years' duration, the two closely related but hostile tribes of the Kauravas and Pândavas with their military forces and allies advance to battle against each other on the field of the Kurus near where Delhi now stands. A mighty crashing of shells, drums and trumpets resounds, and arrows begin to fly from both camps. Then Arjuna, the famous archer of the Pândavas, catches sight of some of his kinsmen in the enemy's army, is shocked at the thought of killing them and lets fall his bow and arrows, because he would rather die than to fight and win under such circumstances. But Krishna, who stands at his side in human form as charioteer on the war chariot, admonishes him to do his duty without considering consequences and convinces him that he must take part in the battle.

These admonitions and instructions of Krishna become more and more profound and treat in sublime diction—in many places with rare beauty and loftiness of expression—the highest questions about the nature of deity and man's relation to it. Upon the foundation of metaphysical speculation is here erected a sublime ethical code. Gradually Arjuna perceives who is speaking to him. Krishna reveals himself to Arjuna as the only God, the Lord of all worlds, who has taken upon himself the form of the hero of the Yâdava tribe, and in the eleventh song at Arjuna's request shows himself in his celestial radiant form penetrating the entire world.

It has long been known that we do not possess the Bhagavadgîtâ in its original text, but in a form which is the result of substantial transformations. The teachings put into the mouth of Krishna in the Bhagavadgîtâ offer a remarkable mixture of pantheistic and monotheistic ideas,

of philosophical thought and of pure and deeply religious faith in God.

A personal God appears in human form, propounds his teachings, demands of the hearer before all else, besides fulfilment of duty, faithful love and submission to him, then reveals himself with special grace in his divine but still anthropomorphic form, and promises that after death as a reward for his love of God the faithful one shall enter into himself, shall attain communion with God. Along with this God, as personal as can be, who dominates the whole poem, there often stands as the highest principle the *impersonal* neutral Brahman, the Absolute. Sometimes Krishna says of himself that he is the only Supreme God who has made the world and all creatures, and governs the All; sometimes he proclaims the pantheistic doctrine of the Brahman and the Mâyâ, the cosmic illusion, and places before man as his highest aim, that he should overcome Mâyâ and become Brahman.

These two doctrines, the theistic and pantheistic, are dovetailed into each other and follow sometimes very directly and sometimes with a loose sort of connection. Nor is the one set forth as the lower, exoteric, and the other as the higher, esoteric doctrine; it is not taught that theism is the preparatory step to knowledge or the symbol of truth, and that pantheism is truth itself; but both forms of faith are treated almost without exception as if there were no distinction between them either as regards value or content.

The attempt has been made to do away with the contradictions in the Bhagavadgîtâ by explaining that no definite system is here propounded, but that it is a poet who speaks, who takes the thoughts and forms them as they crowd upon him without regarding the contradictions which may arise in separate details.

But the great contradiction extending through the

Bhagavadgîtâ can not be set aside by appealing to the poetic temperament. It can only be removed by the assumption that one of the two heterogeneous doctrines which Krishna proclaims in the Bhagavadgîtâ must be a later addition. Therefore Adolf Holtzmann has upheld the view that the Bhagavadgîtâ was originally a purely pantheistic poem and that later it was worked over by worshipers of Vishnu-Krishna whereby it attained its present form. But this also is a mistaken view; the reverse is true. The whole character of the poem is so overwhelmingly theistic both with regard to setting and method, that we must suppose that the Bhagavadgîtâ was from the start a purely theistic poem and was worked over in the pantheistic spirit after the Brahmans had succeeded in winning over the religious community of the Bhâgavatas, the worshipers of Krishna, by identifying Krishna with their god Vishnu who had already become the All-God.

In the ancient poem Krishna speaks of himself—and Arjuna of Krishna—as of an individual, a person, a conscious divinity; in the additions of the redaction the neutral Brahman appears as the highest conception and is occasionally identified with Krishna. In short, *in the ancient poem Krishnaism is set forth which is founded philosophically upon the Sânkhya and Yoga systems; in the additions of the redaction Brahmaism is represented, the forerunner of the system of the Vedânta.* It has long been known that the doctrines of the Sânkhya-Yoga are on the whole the foundation of the philosophical doctrines of the Bhagavadgîtâ, and that compared to them Brahmaism remains considerably in the background. Because of this conviction I have sought in my translation of the Bhagavadgîtâ to select the original form of the poem and have eliminated the additions of the Brahmaistic revision.

The view which I here submit and my corresponding

attempt to a reconstruction of the original Bhagavadgîtâ have met with some opposition but still with more assent, among others from such eminent scholars as Sir George Grierson and Winternitz. Winternitz says[2]: "If we read the poem omitting the passages set off in small print by Garbe in his translation, the result is that there is no gap and that even in many places an interrupted connection is again established by leaving out the verses so indicated. It speaks on the whole in favor of the correctness of Garbe's conception that among the 170 verses cut out by him perhaps ten or twelve at the most can be named which show evidence of any poetical beauty." I myself had not noticed this esthetic consideration, but subsequently became convinced that the Bhagavadgîtâ in my reconstruction far exceeded the traditional text in poetical beauty and unity and must be recognized as the work of a genuine poet.

I will now first present as briefly as possible the doctrines of *the genuine original Bhagavadgîtâ*, i. e., the Bhâgavata faith worked out from the elements of the Sânkhya-Yoga with some new interpretations. In doing this it is not advisable to follow the train of thought of the Bhagavadgîtâ which wanders from one thing to another and constantly confuses the various established standpoints especially in the practical requirements. The religious content of the Bhagavadgîtâ corresponds to the Nârâyanîya section of the Mahâbhârata (XII, chapters 336-353), the second ancient text-book of the Bhâgavatas, except that the latter is somewhat more strongly Brahmaistic than the Bhagavadgîtâ.

[2] *Geschichte der indischen Litteratur*, I, 373. Cf. also *Wiener Zeitschrift für die Kunde des Morgenlandes*, XXI, 196, 197. I would like to utilize this opportunity to make a concession. I consider it very possible that Winternitz is right when in agreement with W. von Humboldt he feels obliged to consider as mainly later additions, besides the verses I have omitted, the last songs of the Bhagavadgîtâ which compare very unfavorably with the first twelve. By this means the scope of the original Bhagavadgîtâ is still further materially diminished.

As an introduction to my exposition, I must say in advance a few words about the conditions under which the adornment of the Bhâgavata religion with the above mentioned philosophical arguments took place.[3] When, according to the genuinely Indian tendency to fuse religion and philosophy, under the especial instigation of the strongly speculative influence of the Kshatriya caste, the effort was made to give a philosophical basis to the monotheism of the Bhâgavata religion, the pantheism which found expression in the older Upanishads was not chosen for this purpose. The home of this pantheism, the doctrine of the Brahman or the All-One, was the so-called "midland" (*Madhyadesha*, the region around and north of Delhi), the home of the Brahmanic civilization and expansion of power. The Brahmanic pantheism fitted but poorly with the popular monotheism of the Bhâgavatas who therefore directed their attention to the philosophical systems which had arisen "in the freer atmosphere of the less Brahmanized outland"—to use Grierson's happy expression—, the Sânkhya and Yoga. Of these two the Sânkhya, purely atheistic and regardless of ethics, was not sufficient for their purpose; for this system could be used by the Bhâgavatas only in the development of the doctrine of matter and its relation to spirit. Since the religion of the Bhâgavatas possessed faith in God and a pronounced ethical character its followers were better served by clinging more closely to the Yoga system which recognized God and pursued ethical tendencies.

The Yoga system is a daughter of the Sânkhya. It has adopted all the important Sânkhya views except its denial of God, and upon these has built up its doctrine of the concentration of thought and the powers to be won thereby. The personal God is inserted into the Yoga system in a very loose and disconnected way and the suppo-

[3] Cf. for the following, Grierson, article "Bhakti-Mârga," ERE, II, 541 *a*.

sition is not unjustified that this insertion has been undertaken in the interest of the union with the Bhâgavata religion; for thus did the system intended originally only for the comprehension of scholars, gain an influence over wider circles. The Bhâgavatas on their side borrowed several concepts from the Yoga system, especially that of the Yoga or the concentration of thought which they gradually transformed in the sense of submission to God, and approximated to the conception of the love of God.[4]

I shall begin my analysis of the doctrine of the Bhagavadgîtâ with the *systematic* part, and start with the personality of God. God is a conscious, eternal and omnipotent being, the "great Lord of the world without a beginning" (X, 3). He is not only different from the perishable universe but also from the imperishable spirit of the beings (XV, 17-19), hence spirit in another and a higher form than the souls of all creatures. When we read in VII, 4-6 that God possesses two natures, a higher spiritual nature through which the world is preserved, and a lower material nature consisting of everything that according to the Sânkhya belongs to *prakriti* or matter, we must not understand by this that matter constitutes one-half of God's essence. Rather does it mean that matter itself is not independent, following its own blind impulses, but unfolds under the direction of God; in other words, that God operates in matter and acts through it. This is established beyond doubt in other passages of the Bhagavadgîtâ. God implants in matter the germ of development (XIV, 3, 4) and hence is the father of all creatures, whereas matter may be compared to the mother's womb (XIV, 4). God directs the origin, development, and dissolution of the universe (IX, 7, 8, 10) and in this sense he calls himself the beginning and the end of the whole world (VII, 6; X, 8)

[4] The significance of the Yoga system for the Bhâgavata religion is still clearly apparent in the legend of Akrûra, Bhâg. Pur., X, 57, 29, in Grierson, IA, 1908, p. 257, Note 25.

and identifies himself with death (XI, 32). All conditions of beings are derived from him (X, 4, 5), he directs their fate, i. e., rewards them according to their deeds, and so causes creatures in the course of life "to whirl around like figures on a puppet stage" (XVIII, 61). All God's actions are performed merely for the sake of the world; for himself there is no desire to be fulfilled, no purpose to be attained (III, 22, 24). "Whenever right is decreasing, and wrong is increasing," God who has existed from eternity and is imperishable, creates himself anew, i. e., assumes new forms of manifestation "for the protection of the good and the extermination of the wicked, in order to establish justice" (IV, 6-8). Because God's acts pertain always to the creation he governs and never arise from any selfish motive he is not bound by his acts (IV, 13, 14; IX, 9); hence he can never be entangled in the world's existence. The visionary description of God in Song XI is a dramatic adornment intended to work upon the imagination, but is of little importance for the teaching of the Bhagavadgîtâ proper.

The relation of God to the world of men is not only determined by the stern law of compensation, but *God loves the people who recognize him and submit to him with their whole hearts,* (VII, 17; XII, 14-20; XVIII, 64, 65, 69), *and he saves from all sins those who take their refuge in him alone* (XVIII, 66). Here (and likewise XVIII, 56, 58, 62, 73) *we already have faith in divine mercy* (*prasâda*) which we meet with in some later Upanishads and which consequently plays so conspicuous a part in the Indian sects.

Although God directs the dispensation of the universe, yet, as we have seen above, it is matter which performs all acts (III, 27; V, 14; XIII, 20, 29). The world develops from primitive matter and returns to it again (VIII, 18, 19); the idea of evolution and reabsorption as well as the

notion of the eons is borrowed from the Sânkhya system. On the whole all views pertaining to matter in the Bhagavadgîtâ agree with the Sânkhya doctrine. The three *gunas*, or constituents of matter,[5] play the same part here as in the Sânkhya system; i. e., by their influences they put the spirit in fetters (XIV, 5 ff.), and the consequences of their activity are manifest in life on every hand, as is shown in great detail in Songs XVII and XVIII. The physiological ideas about the internal organs and senses are likewise those of the Sânkhya system (III, 40, 42; XIII, 5). All these agreements, however, are not so important for the teaching of the Bhagavadgîtâ as the fundamental conception with regard to the nature of matter which was borrowed from the Sânkhya and from which starts the philosophical speculation in Song II. To be sure matter was not created by God, but has existed from the beginning, and is subject to constant change and transformation.

All its products and effects are transitory; its influences, especially joy and pain, come and go and hence do not deserve that we should allow ourselves to be regulated by them (II, 14).

In contrast to this mutability of everything that matter brings forth stands the immutability of *spirit*. The spirit (the soul, the self) resembles matter only in so far as both are eternal and indestructible; for what is has always been and always will be, "the non-existent knows no existence, the existent no non-existence" (II, 16); but the great contrast between matter and spirit consists in the fact that the latter is never capable of change. Indeed the spirit dwells in the body absolutely inactive, "neither acting nor causing to act" (V, 13-15) and remains unmoved by all influences and operations of matter. This is brought out in sublime language in the second song. Whosoever knows

[5] See my *Sânkhya-Philosophie*, 209-220, *et passim*; "Sânkhya und Yoga," *Grundriss der indo-arischen Philologie und Altertumskunde*, III, No. 4, pp. 19, 20.

that the spirit is the true self, that the worn-out body is abandoned and passes into a new one as old clothes are laid aside and new ones donned (II, 22), that the spirit can be neither injured nor destroyed—such a one does not lament over the suffering and death of a man, that is to say, over matters which concern only the perishable body.

All this is pure Sânkhya doctrine; but nevertheless the conception of the spiritual principle in the Bhagavadgîtâ is essentially different from that in the Sânkhya system, not exclusively philosophical but predominantly religious. According to the Bhagavadgîtâ, which proclaims the faith of the Bhâgavatas, the individual soul has not led a separate existence from the beginning, but has detached itself from the divine soul as a separate part (XV, 7; cf. also XVI, 18; XVII, 6). Hence the individual souls have a divine origin; they have entered into a connection with matter which is not able to produce any transformation in them but which has brought life and consciousness into the world. It is man's task so to conduct himself that his soul may return again to its origin, to God.

With this we come to the practical part of the doctrine of the Bhagavadgîtâ. Here stand the two opposing ways of salvation, one of which consists in withdrawing from worldly life and striving after knowledge, the other in acting according to duty apart from all desire. Although the second way is frequently characterized as the better one (III, 8; V, 2; XVIII, 7) and according to the whole context of the Bhagavadgîtâ is to be regarded as the particular moral ideal of the poem, still the author has not dared to disregard the path of salvation of world renunciation and abstract knowledge. The idea that salvation from the circuit of life is to be attained by meditation in complete isolation from the world had been for centuries so rooted in the thoughtful circles of the Indian people that it could not be seriously opposed. Nothing else remained

than to recognize both ways side by side and to teach that right action led to salvation as well as knowledge which presupposed the renunciation of works and inactivity. From the fact that in the Bhagavadgîtâ now one standpoint is advocated and now the other, and occasionally the ideal of quietism is frankly placed above that of activity (VI, 3), all sorts of inconsistencies and confusions have arisen which might have been avoided by the positive rejection of the quietistic standpoint. The two standpoints are assimilated with one another in the Bhagavadgîtâ by the explanation that the dutiful act performed entirely without reference to consequences and without any personal interest loses its effective power, and hence does not result in continued existence for the doer. Actions of this kind therefore in this respect have the same value as the inactivity of the way of salvation through knowledge.

The knowledge to be attained on the quietistic path of salvation is described in several passages (XIII, 23; XIV, 19) exactly in the sense of the Sânkhya system, as a distinction between spirit and matter; and as a result of this distinction the prospect of liberation from the necessity of rebirth is held out to the one who possesses this knowledge (XIII, 23) without reference to his conduct. This may be looked upon as an isolated recognition of the genuine Sânkhya ideal. In general the saving knowledge, according to the view of the Bhagavadgîtâ, is not limited to the distinction between spirit and matter, but this distinction may be regarded only as a preliminary condition of the *knowledge of God* which in truth leads man to supreme salvation.

The other path of salvation, the Yoga, conceived as disinterested fulfilment of duty, is preached in the Bhagavadgîtâ incessantly and in various ways. Fulfilment of duty alone would not lead to the goal as long as it is in the slightest respect accompanied by hope for the results. Man

should do what is commanded him without passion, with quietness and equanimity, feeling the same towards every one, esteeming of equal value pleasantness and unpleasantness, joy and pain, success and failure, without desire and without any personal interest. The works of him who acts with this disposition, without troubling himself about the transitory effects of material things (II, 14) solely according to the dictates of duty and following the divine example (III, 22) and leaving the results of all his work to God, are not subject to the law of compensation (IV, 22, 23; IX, 27, 28; XVIII, 12, 17). The requirements here set forth presuppose the condemnation of the Vedic ritual which in the original Bhagavadgîtâ is enunciated without any limitation. All the ceremonies of the Brahmanic ritual serve personal desires throughout and hence stand in sharp contrast to the ideal of morality of the Bhagavadgîtâ. "Give up all sacred usages," we therefore read in XVIII, 66, and in II, 42-45, outspoken scorn is shown for the promises of the Veda which take only the material world into account and offer only transitory rewards (cf. also IX, 20, 21). Accordingly indifference for the prescriptions of the Vedic ritual is likewise a preliminary condition for the attainment of salvation (II, 52, 53). That in this requirement also we have genuine Sânkhya-Yoga doctrine is clear to every one acquainted with the Indian systems.

Whichever of the two paths of salvation man may follow, in both cases he must overcome an obstacle in his natural disposition. When it is said in III, 33, that "beings follow their nature" and when in XVI, 1 ff. the distinction is made between men born for divine existence and those born for a demonic existence, this predetermination is to be understood as an effect of previous merit or of previous sin. In the Bhagavadgîtâ there is no question of predestination properly so called. Instead we can

recognize in it the assumption of moral freedom. Man is entirely free whether or not he will overcome the obstacles which lie upon the path to salvation, whether he strives after low aims or the highest. On the path to the latter innate ignorance stands opposed to the practice of knowledge (V, 15), and the likewise innate desire which is the peculiar enemy of mankind to the practice of duty (III, 37, 43); but unbelief and skepticism are also destructive (IV, 40). As an expedient toward the successful overcoming of these obstactles moderate Yoga exercises are recommended (V, 27, 28; VI, 10 ff.; VIII, 10, 12 ff.). Even if a man is not successful in mental concentration these Yoga exercises are nevertheless not in vain, for such a man is reborn under favorable circumstances and finally attains the supreme goal (II, 40; VI, 41 ff.).

We finally come to the most important requirement which the Bhagavadgîtâ makes of men in need of salvation. As is well known the Bhagavadgîtâ is the Canticles of *bhakti,* the faithful and confiding love of God. Both on the path of knowledge and on that of the self-denying fulfilment of duty, love to God leads to the goal with absolute certainty. The whole poem is filled with this thought; to proclaim this thought it was written. From the love of God arises the *knowledge of God* (XVIII, 55) and love of God likewise brings about that the faithful refer all works to God and leave the consequences to him. To every one without distinction of birth or of previous behavior bhakti vouchsafes the certainty of salvation—even to criminals, women, Vaishyas and Shûdras (IX, 30-32). But it is not a question of a passing impulse of love for God, but the whole nature of man must be filled with an unchangeable love. When this is the case man's thoughts are directed upon God even in the hour of death. Special weight is laid upon this point in the Bhagavadgîtâ (VIII, 5, 9, 10,

13) because man enters into that form of existence of which he is thinking in the hour of death (VIII, 6).

What now are we to understand of the condition of the soul which has been freed from the existence of the world and has entered into God? Are we to regard it as unconsciousness, as is taught in the Sânkhya-Yoga? Is the individuality of the soul which once separated itself from the divine soul, extinguished in the return to its origin? No! Salvation is thought of as a blessed condition of the soul which continues to exist in its individuality in the presence of God.

This has remained for all time a fundamental and leading doctrine of the Bhâgavata religion. God has caused all individual souls to go forth from himself to a separate conscious existence and since then they exist for all eternity as individual conscious beings. When they have won salvation from their worldly existence they do not become God but become like God and at his feet enjoy an everlasting bliss which consists solely in serving him.[6] How indeed on the assumption of the Sânkhya-Yoga a soul can lead a conscious existence without regard to matter, we learn neither from the Bhagavadgîtâ nor any other Bhâgavata work. Apparently we have here to do with a view which is derived from the earliest times of the Bhâgavata religion, and which ever since these times has formed one of the main props of this faith. Therefore in its adornment with elements of the Sânkhya-Yoga this view must not be supplanted by the opposite doctrine of the two systems. Pious conviction helped to do away with the difficulties of method which thus arose. In general, however, the religio-philosophical doctrines of the *original* Bhagavadgîtâ, as the above exposition shows, are of transparent clearness. This clearness is greatly impaired by the pantheistic redaction. The traditional form of the poem in

[6] Grierson, ERE, II, 544*a*.

which sometimes the personal God (Krishna) and sometimes the impersonal World Soul (the Brahman) appears as the supreme principle, and both are often identified, in which sometimes the conscious continued existence in the presence of God and sometimes the absorption into the world-soul is set up as the highest goal—is full of intrinsic contradictions.

Looking back we find in the Bhagavadgîtâ the following agreements with Christian views:

1. Faith in God's love to man and in his mercy and forgiveness of sins arising therefrom;

2. The requirement laid upon man of faithful love to God, *bhakti*.[7]

From these agreements have arisen all sorts of similarities of New Testament modes of expression which very naturally suggested the thought of a loan.

Lorinser[8] has gone the farthest in pursuing this idea when with great decision he expresses his conviction, "that the author of the Bhagavadgîtâ not only was acquainted with the writings of the New Testament and made frequent use of them, but on the whole has woven into his system Christian ideas and views," "that this much admired monument of the spirit of ancient India, this most beautiful and loftiest didactic poem which can well be regarded as one of the noblest flowers of pagan wisdom, owes precisely its purest and most highly praised teachings for the most part to Christian sources" (page v). Lorinser even undertakes to show from what writings of the New Testament more and from what fewer "sentences are borrowed," that "all the epistles of St. Paul with the exception of those to the Thessalonians and to Philemon were utilized" (page 285), and the like.

No one to-day would dare draw such bold conclusions

[7] See above, pp. 501, 506.

[8] In the introduction, notes and appendix to his metrical translation of the Bhagavadgîtâ, Breslau, 1869.

from such very indefinite similarities in thought and expression. Even Lorinser would certainly not have allowed his joy in discovery to carry him so far beyond all bounds if he had been more intimately acquainted with the Hindu thought cycles.[9] Even A. Weber, though always inclined to a great extent to believe in Christian influences upon India, thinks that Lorinser has greatly overestimated the weight of his argumentation, and that the question whether an acquaintance with the doctrines of Christianity must be assumed for the Bhagavadgîtâ, still continues to be *sub judice*.[10]

Almost all the other Indologues have completely rejected Lorinser's argumentation, last of all Winternitz[11] in whose opinion "not more than twenty-five of the more than one hundred parallel passages from the Gospels which Lorinser compares with passages of the Bhagavadgîtâ, are of such a kind that a loan would be *conceivable*. However, in no single case," Winternitz continues, "is the similarity so close that the assumption of a loan would be any more probable than that of an accidental agreement. Even love of God is not of course limited to Christianity. I will only mention Sufism in which it plays no less significant a part than with the Christian mystics."

But the best criticism of Lorinser's theory is furnished by the materials collected by John W. Robertson[12] who brings forward from the *pre-Christian* Greek and Roman literature passages which bear a much greater similarity to New Testament ideas than the verses of the Bhagavadgîtâ which Lorinser compares with them.

[9] A particularly striking proof of this deficiency in Lorinser I have mentioned in my translation of the Bhagavadgîtâ, page 105, Note 3.

[10] *Indische Literaturgeschichte*, 2d ed., 367.

[11] *Geschichte der indischen Litteratur*, I, 370, Note 3.

[12] *Christianity and Mythology*, London, 1900, 285, cited in van den Bergh van Eysinga, *Indische Einflüsse auf evangelische Erzählungen*, 2d ed., 21, Note 4.

Of all the Indologues Hopkins after his change of view[13] approaches most closely the standpoint of Lorinser. Hopkins[14] has collected a large number of parallels from the Bhagavadgîtâ and the New Testament and incidentally has ascribed particular significance to the circumstance that most of them are to be found in the Gospel of John. That in the narrow space of this Gospel so many parallels "partly of surprising similarity" stand side by side, seems to Hopkins in consideration of the more general agreements in the other Gospels, to be an almost conclusive proof of the dependence of the Bhagavadgîtâ. Hopkins explains the partiality for the Fourth Gospel alleged to be observed in the Bhagavadgîtâ from the fact that this Gospel—perhaps not uninfluenced by the gnosticism of that time—was peculiarly suited because of its mystical tone to cause the Indian theologians to borrow such expressions and thoughts as best fitted in with the conception of Krishna as a god of love.[15]

It would lead too far and would not be worth while to speak in detail of the parallels brought forward by Hopkins after I have already (July *Monist*) treated more particularly of the Christian similarities in other parts of the Mahâbhârata in which Hopkins considers a loan from the New Testament possible. All those similarities are satisfactorily explained from the intrinsic parallelism of the fundamental religious and philosophical conceptions of the Bhagavadgîtâ and the Gospel of John. We shall also see at once that the age of the Indian ideas precludes the assumption that they were borrowed from Christianity. First I will add that Paul Deussen in his translation of the Bhagavadgîtâ points out only in the following three verses the passages of the New Testament (in John and

[13] See "Christian Elements in the Mahâbhârata excepting the Bhagavadgîtâ," in *The Monist* of July, 1913, page 337, Note 33.

[14] *India Old and New*, 148-159.

[15] *India Old and New*, 155, 158.

Galatians) which are related in sense, without taking into consideration the possibility of a loan.

Bhag., IV, 4, 5. (After Krishna has told Arjuna that he has proclaimed to Vivasvat the imperishable doctrine of submission in the days of old, Arjuna asks): Later is thy birth, earlier the birth of Vivasvat; how am I to understand that thou hast proclaimed the doctrine before him? (Krishna answers): Many have been my past births....all of these I know, etc.	John, viii. 57, 58: Then said the Jews unto him, Thou art not yet fifty years old, and hast thou seen Abraham? Jesus said unto them, Verily, Verily I say unto you, Before Abraham was I am.
Bhag., IX, 29: I am the same to all creatures; no one is hateful to me and no one is dear. But those who are devoted to me in love are in me and I in them.[16]	John xiv. 20: At that day ye shall know that I am in my Father, and ye in me, and I in you.
Bhag., IX, 32: Even those, O Son of Prithâ, who are of lowly birth, women, Vaishyas and Shudras, will attain the highest aim, when they take their refuge in me.	Gal. iii. 28: There is neither Jew nor Greek, there is neither bond nor free, there is neither male nor female: for ye are all one in Christ Jesus.

I now come to the question, What on the whole is the historical possibility of the assumption of Christian influences upon the Bhagavadgîtâ? The traditional text belongs to a period in the development of the Mahâbhârata which with Hopkins[17] we must place in the time between 200 B. C. and 100-200 A. D. I had thought that I had ascertained for this text (i. e., for the redaction of the Bhagavadgitâ in the pantheistic sense), the second century after Christ and for the composition of the original

[16] Deussen might just as well have named as parallel passages to this verse of the Gospel of John the two following verses of the Bhagavadgîtâ, IV, 35: "Thou wilt not again, so fall into confusion, Oh Pândava, when thou hast attained the knowledge by which thou wilt perceive creatures without exception (first) in thyself and then in me;" and VI, 30: "Who sees me in all things and all things in me, from him will I not be lost nor will he be lost from me." It is clear that these verses of the Bhagavadgîtâ express the well-known fundamental view of Brahmaism. It is remarkable however that these parallels to John xiv. 20, which are closer than all other agreements with the New Testament brought forward from the Bhagavadgîtâ, are entirely lacking in Lorinser's lists of alleged loans.

[17] See the introduction to my translation of the Bhagavadgîtâ, 58 ff.

poem the second century before Christ.[18] A considerable interval must be assumed between the two compositions for the reason that in India they would not have dared until after considerable time had elapsed to transform by such a comprehensive revision and redaction a work which was considered a revelation of deity and was surrounded by the nimbus of the greatest sanctity. But there may be different opinions about the length to be assigned to this interval. However, for the question in hand the problem is of secondary importance since of course the adherents of the theory of Christian influence can insist that this influence was not felt until the revision of the Bhagavadgîtâ. If the date I have just assigned to the revision is correct it excludes the assumption of Christian influence, because at the very earliest Christianity penetrated into northwestern India at the beginning of the third century. Any *considerable* shifting of this date to a later time is excluded; nevertheless some scholars like Lassen, Weber, and John Davies place the composition of the text of the Bhagavadgîtâ as it has been handed down, in the third century, and for this time to be sure although we cannot grant the probability of Christian influence, there is nevertheless a remote possibility of it. Moreover since some specialists believe in the historical character of the legend of St. Thomas as far as it concerns the Indo-Iranian borderland and at the same time consider Christian influence possible as early as the first century, the proof for the love of God and a loving God in a pre-Christian age must be found here.

Scholarly Indians[19] claim that the religion of *bhakti*,

[18] My main reason for the latter date which I derived from the age of the Yoga-sûtras, pp. 62, 63 of my introduction) I can no longer maintain since H. Jacobi has proved in a keen and convincing fashion that the author of the Yogasûtras, Patañjali, is not identical with the grammarian of the same name and that he can not have written before 450 A. D. (JAOS, XXXI, 24 ff.).

[19] For instance R. G. Bhandarkar in his *Report on the Search for Sanskrit Manuscripts in the Bombay Presidency During the Year 1883-84*, Bombay, 1887, p. 74, near the bottom, and at the end of his lecture on "The Râmânu-

or faithful confiding love of God, has existed in India time out of mind. The statement is certainly not correct in this form for the reason that such a high degree of culture as is necessary to produce the idea of love of God never existed on earth in immemorial times; but still it contains an element of truth, for bhakti did not, as Grierson once erroneously said,[20] make its appearance directly and like a flash of lightning as something quite new whereby knowledge (of the alleged truth) has been forced out of its dominant position in religion, but in its beginnings and earliest impulses it may be traced back to ancient Vedic times.[21] In the Rigveda where the gods are often called father, brother, friend, etc. and are supplicated for health and protection in all sorts of expressions of childish confidence, the ancient poets were prompted to use these words from the same feelings that joined them to the human beings who were most closely related to them. When monotheistic tendencies had gained the upper hand, this old feeling of naive affection for the gods was gradually ennobled and exalted to a submissive, devout and confiding love of God which filled the whole personality. Love of God first became the pinnacle and center of religious life among the sect of the Bhâgavatas out of which Krishnaism arose; it seems also to have received the name *bhakti* among the Bhâgavatas as this word is derived from the same root as *Bhagavat* and *Bhâgavata*.

From Pânini's grammar (IV, 3, 95, 98) it follows that at the time of its composition *bhakti* was not only used in the secular sense of "love, submission, devotion," but that it was also applied to men's relations with God.

jiva and the Bhâgavata or Pâncharâtra Systems," before the Aryan section of the Congress of Orientalists at Vienna in 1888. See also B. C. Mazumdar, JRAS, 1910, 171.

[20] JRAS, 1907, 313 at the bottom. But he no longer holds this view in *ibid.*, 1910, 172; ERE, II, 539*b* at the bottom.

[21] Max Müller, *History of Ancient Sanskrit Literature*, 537 ff.

The connection of the word with Vâsudeva in rule 98 is a proof which is now indisputable since Grierson has definitely refuted Kielhorn's view that Vâsudeva in this passage is not the name of a god, but of a human person.[22] Heretofore it has been generally supposed that Pânini lived about 300 B. C., but there was not a positive proof for this date. Now from Jacobi's study of the Kautiliya[23] we know with certainty that Pânini was recognized as a grammatical authority as early as the fourth century B. C. Accordingly in its religious signification *bhakti*, because mentioned by Pânini, must have been a generally current concept in India about 400 B. C. Therefore it is not at all necessary to assign a later date to the Shvetâshvatara Upanishad because of its concluding verse, "He who feels the highest love to God (*yasya deve parâ bhaktih*)...."

When Hopkins says[24]: "The doctrine of bhakti, faithful love as a means of salvation, can not be much older than the Song" (i. e., the Bhagavadgîtâ), we must on the contrary emphasize that it may have been proclaimed in the circle of Krishna worshipers centuries before the composition of the original Bhagavadgîtâ. A new doctrine is submitted differently than the bhakti in the Bhagavadgîtâ where this sentiment is required throughout as a matter of course. It is found also in the closest connection with the doctrine of devotion (*yoga*) which in the beginning of the fourth song Krishna expressly characterizes as very ancient.

The assumption that the use of the word *bhakti* in its

[22] JRAS, 1909, 1122. See also R. G. Bhandarkar, *loc. cit.*, 1910, 168-170. Edmund Hardy, in the *Lit. Centralblatt*, 1903, col. 1269, has further called attention to the fact that *bhakti* (in the Pâli form *bhatti*) appears in Jâtaka V, 340, 3, 6, and 352, 11, denoting "love, devotion," and with regard to the transition to the specific meaning, love of God, has referred to Theragâthâ, verse 370. Hence we have here from the far south a further proof that the Indian idea of the love of God is older than Christianity.

[23] *Sitzungsberichte der K. Preussischen Akademie der Wissenschaften*, 1911, XLIV, 966.

[24] *Religions of India*, 429.

specifically religious sense has been brought about by a conception borrowed from Christianity ought not to require any further refutation. The idea was very improbable from the first because distinct traces of the religious sentiment which Hindus call *bhakti* are to be found also in the Greek and Roman religions in pre-Christian times.[25] In this respect the Indians, who from the earliest days have always taken the salvation of the soul more seriously than most other peoples, have certainly not remained behind the Greeks and Romans in development.

The idea of Krishna as a loving God must also have been as old as that of the love of God; for each of these ideas is dependent on the other. Only a loving God could demand love. But a loving God also shows mercy and by forgiving sins delivers from perdition otherwise unavoidable. Although *prasâda*, the usual word for the grace of God first appears in the later Upanishads[26] and in the passages of the Bhagavadgîtâ cited above (p. 501), yet the idea of divine grace itself is much older. Without it the countless prayers of the Vedic poets for all manner of divine favors would not have been possible. Hopkins[27] instances as a particularly characteristic case the verse in the Rigveda (10, 125, 5) where speech (Vâch) personified as a goddess declares "Whom I love I shall make a man of power, a priest, a seer, a sage."

Hand in hand with the victorious advance of the monotheistic faith in a loving God must have gone the development of the doctrine of his grace. "The doctrine of *prasâda*, or grace, has formed an essential part of the Bhâgavata religion so far back as literature takes us," says Grier-

[25] Barth, *Religions de l'Inde*, 132; A. Berriedale Keith, JRAS, 1907, 490.

[26] Kath., 1, 2, 20; Shvet., 3, 20; 6, 21; Mund., 3, 2, 3 (Hopkins, *Great Epic*, 188). It is probable that we have here a loan from the Bhâgavata religion since the idea of mercy does not harmonize with the Upanishad doctrine of the pantheistic Brahman. Grierson, IA, 1908, 260, Note 34.

[27] *India Old and New*, 147 note.

son,[28] and in this connection he emphasizes most decisively that India owes the idea of a God of mercy, of a kind father, to the Bhâgavatas.

The seemingly Christian coloring of the Bhagavadgîtâ and of those later portions of the Mahâbhârata whose contents are akin to it, must therefore in consideration of all that I have here set forth be characterized as an outgrowth of genuine Indian religious feeling.

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[28] In the article "Bhakti-Mârga," ERE, II, 543*b* note.

THE ACCESSIBILITY OF BUDDHIST LORE TO THE CHRISTIAN EVANGELISTS.

THE great difficulty in the way of Christian scholars accepting the fact of Buddhist elements in the Gospels is our ignorance of the extent of Buddhism at the time of Christ.

We imagine that before Luke and John could quote a Buddhist text they would have had to learn Sanskrit or Pali! But in view of recent discoveries no such wild fancy can any longer be. We now know from existing evidence that there were at the time of Christ the following sources of information about Buddhism accessible to the Evangelists:

1. Scenes in Buddha's life pictured in stone upon temples at Bharahat, Sâñci (probably), and Anurâdhapura. The first two remain to-day, while the list of life-scenes at the third is preserved in the *Great Chronicle* of Ceylon. As travelers were coming and going continually, some account of these sculptures was accessible to studious men in cities like Rome, Antioch and Alexandria.

2. Buddhist texts translated into Sogdian and Tokharish, two dialects understood by the Parthians who were present at Pentecost.[1]

3. Lives of Buddha, manuals and elementary books on Buddhism known to have been translated into Chinese from

[1] See my article, "The Progress of Buddhist Research," in *Mahâ Bodhi Journal*, July, 1912.

the first century onward, and which it is reasonable to infer that the Buddhist missionaries had already translated into Tokharish and Sogdian, because the religion was in Bactria and probably in Parthia before it was in China.

4. Buddhist folk-tales which traveled orally or even in writing, and which were sculptured in abundance upon the temples already named. Hindu fairy tales have been traced by Jacobs in the Talmud, and one has lately been found scribbled upon an Egyptian vase of the first century.[2]

We are only following the methods of science followed by Adams and Leverrier as they watched for the planet Neptune, when we reason from the known to the unknown and infer that Matthew and Luke were using a Buddhist source in their story of the Lord's three temptations:

1. Temptation to assume empire,
2. Temptation to transmute matter,
3. Temptation to commit suicide.

I have shown in my article in *The Monist* for January, 1912,[3] that our Gospels agree more closely with the Buddhist temptation story than with the Zoroastrian, though the latter was nearer, both geographically and theologically. In our present recensions of the Buddhist scriptures, in Pali and Chinese, these three temptations do not occur all together as in the Gospels, but two of them in a five-volume work and another in a three-volume work. This is the basis upon which Louis de la Vallée Poussin tells his clerical readers that I believe that Luke had the Classified and Long Collections (eight volumes) before him when framing his story of the Temptation![4] Many

[2] W. Max Müller, the Egyptologist, tells me this.

[3] In reply to this article, Professor Garbe, in *The Monist* of July, 1912, p. 478, made the generous admission that I had heightened the probability of the loan hypothesis.

[4] *Revue des sciences philosophiques et théologiques*: Kain, Belgium, 1912, (Article: "Les religions de l'Inde et l'Apologétique"). To complete the joke, La Vallée should have added that, in my belief, Luke was a subscriber to the Pali Text Society of Alexandria.

an ecclesiastic has doubtless enjoyed a laugh over this, as indeed I have enjoyed it myself. But in order to avoid this very hypothesis I had pointed out, in an article in *The Open Court* for January, 1912, that there were at the time of Christ numerous lives of Buddha, manuals and elementary treatises on Buddhism. We know this from Chinese catalogues of Buddhist literature which represent the Hindu, Bactrian and Parthian Buddhist books of the first century.

Moreover, there were numerous recensions of the Scriptures including the Book of Temptations. Eighteen sects, says the *Island Chronicle* of Ceylon, had each its own recension of the canon and swore that it was the right one. Now it is a very simple inference from known facts about the diversified arrangement of Buddhist texts, that there was at the time of Christ a recension of the Book of Temptations wherein all three temptations occurred together. It is practically certain that such was the case, for in the Suicide Temptation (late in Buddha's life) the Decease Book indicates that the same temptation had been made before, and that Buddha had given the Devil the same reply. In our present recensions of the Book of Temptations, in Pali and Chinese, this earlier suicide temptation is lacking.

In my *Monist* article, I adduced the angelic heralds and their hymn in Luke ii as a probable Buddhist loan. I should now like to add that the crucial words "For weal and welfare in the world of men" (Luke's well-known Christmas peace and good-will) were sculptured in substance upon the Girnâr Rock in the third century before Christ:

"The White Elephant who is called Bringer of Happiness to all the world!"

Christ was symbolized as a white and gentle lamb, and Buddha was symbolized as a white and gentle elephant.

He antedated Christ by several centuries as the first conception of a world-Messiah (unless our Mazdean friends can prove that Zoroaster was so conceived).

Besides Asoka's inscription at Girnâr, we have lately found one by Kanishka at Peshawar, wherein the words occur:

"Let it be for the weal and welfare and benefit of all beings!"

Among the scenes which were favorites to be sculptured upon topes, none was more prominent than the legend of Prince Workman-quarter, known in Pali as the *Vessantara Jâtaka*. According to this widespread folk-tale, the Buddha, in a former incarnation, was born in the workman's quarter of a capital and grew up to be a great philanthropist. He gave all he had away, including a magic rain-bringing elephant, and for this crime against the state he was banished. At last he gave even wife and children away, but, like Job, was restored to his former happiness.

Now this very story, which is at Bharahat, Sâñci, Aja*ntâ*, Amarâvati, and has lately been found by Aurel Stein at Miran in Chinese Turkestan, was also graven upon the Anurâdhapura tope; and visitors from Alexandria came to the opening ceremonies in the second century before Christ. To crown all, the desert sands have just now yielded up a copy of the story in Sogdian, so that there was no excuse for an Antioch physician or an Ephesian Philonist, who were well versed in religious lore, to be ignorant of it. Sogdian was probably meant by Strabo when he said that nearly the same language pervaded Media and parts of Persia, Bactria and Sogdiana. And students of religion must have known about the great faith whose books were being translated by missionaries into the tongues of a neighboring empire.

I will end by translating from the Pali (Jâtaka 547 and

last) the vow of the former Buddha to sacrifice himself for mankind:

"When I was a child but eight years old,
Then, lying in my palace, I thought thus
upon gifts and giving:
My heart would I give, mine eye,
my flesh or my blood;
I would press out my body and give it
if any one should ask me!"

In the Sogdian version, just translated into French by Gauthiot, the vow is much nearer to Christian ideas; and it belongs to the research of the future to determine whether the story was rewritten under Nestorian influence in Central Asia, or whether these Mahâyâna ideas were not already developed by the time of Christ.

The Sogdian vow runs thus:

"May I obtain the quality of a Buddha; may I deliver from hell the living beings of the five forms of existence in the three worlds; may I disenthral them from evil; may I fasten the gates of hell; extricate from sufferings the living beings guilty of crimes and lead them to salvation (*Mokshanirvâna*) by the same way that the other Buddhas followed!"

Observe that the term for[5] *salvation* is not in Sogdian, but in Sanskrit. This is because religious terms are often untranslated, like *presbyter, bishop, church,* and other Greek Testament words which have become naturalized in the languages of Christendom.

The use of Sanskrit instead of Pali need not indicate a late date for the Sogdian version, for we are told by the Tibetans that the recension of the Hînayâna scriptures of the Sarvâstivâdin school was in Sanskrit. And a fragment of Vinaya found in Tokharish, a neighboring dialect, is in the Sarvâstivâdin form.

[5] *Journal Asiatique,* janvier-février, 1912, p. 184. Frequently repeated throughout the Jâtaka.

In spite of all the lost literature of the first and second centuries, we have enough fragments left that indicate Hindu and Parthian[6] literary influence.

The magical books of Scythianus, the Parthian Book of Elkesai, the Hindu folk-tales in the Talmud aforesaid, and other obscurer traces collected in the Historical Introduction to *Buddhist and Christian Gospels*, are enough to satisfy any philosopher who understands how to take account of the unknown.[7]

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[6] In the Parthian Empire Buddhism was mixed with Mazdeism.

[7] See Darwin's "Imperfection of the Record," in his *Origin of Species*, with my remarks thereon in *Buddhist Texts in John*. In the latter also is a complete list of the sculptured scenes at Anurâdhapura.

THE HIGH COMEDY OF PHILOSOPHY.

There can be no vision without laughter.

SOME time ago I was discussing before a university class the different phases of philosophy, and not unnaturally the discussion involved many of the various definitions of philosophy that have been, to speak geologically, deposited through the ages. The number was appalling. Although it is not difficult to show a certain underlying agreement among them all, it still remains that there have been about as many definitions as philosophers. Indeed many a philosopher has indulged himself and puzzled the world with more than one, for, like many other things, philosophy changes in meaning with changes of standpoint or mood. But, as definition after definition passed before the view, the situation finally struck me as very amusing, and the cause for amusement was not merely the large number—which, I hasten to say, I did not try to exhaust—nor the great and amazing variety, ranging all the way from "a disease," albeit a "sacred" one, to "perfect wisdom" or "the science of the sciences," and from "the highest music" or "imitation of deity" or "meditation on death" to "the science that equates entity with nonentity and nonentity with entity," but also the unbridled extravagance, not to say the splendid absurdity, the superlativism of nearly every one.

"What a comedy this all is!" I found myself exclaiming inwardly and on the impulse of the moment I boldly added

to all the other definitions one more, as follows: "Philosophy is the highest comedy." So, doubtless, many of the other definitions came to be and so in one more way had philosophy made claim to a superlative! But—this bit of personal biography is nearly at an end—having fallen into that new definition of philosophy I was obviously under the necessity of either getting out of it, for it might prove a very deep hole indeed, or of explaining what I meant and proving the right of it even to the point of transforming what looked like a deep hole into a mountain-top with a fine view. So, not without some confidence, I set to work and in the end I convinced myself, if not others, that whatever truth or value might belong to other definitions no one could ever understand philosophy who failed to feel the comedy of it or be himself a philosopher who had no sense of humor. There could indeed be no real vision without laughter.

Of course philosophy is very commonly laughed at. Aristophanes set an example some years ago and in this matter instruction either by example or precept, however stimulating, has never been really needed. The philosopher has been the butt of much laughter, both open and with its head in the sand, ever since he began to make a spectacle of himself by philosophizing. He has made sport for others generally, not merely for the unphilosophical—are there any such?—readers of this essay. But *why* has he been laughed at? Any philosophical reader excepted as a matter of course, *because* in so many ways and with so much calm assurance he allows himself to be amazingly absurd and *because*, as I have to add, only suggesting how his disease may be not wholly without sanctity, he does appear even in his folly to see something not wholly unreal and to say something not wholly untrue.

Does any one ask me, out of his wonder and innocence, in what ways philosophy is absurd? Let some of the popu-

lar accounts of philosophy that seem not to have come to his notice give reply. However trite they will afford a very good introduction to my apology for the new definition. Thus here is one account.

Philosophy answers two questions in its own inimitable way. What is matter? Never mind! And mind? No matter!

Again, while art is all *eye* and religion is all *aye*, philosophy is also all *I*.

Then philosophy is anything that no one understands or in its arguments—it is always arguing—it is the gathering together in the name of truth of two or more not one of whom ever knows what he himself or any other is talking about. Philosophy is not art, not law, not science, not common sense, not religion, not anything in fact that any normal man cares about; and being so exclusive of all the ornaments or utilities or inspirations of life it is—here comes what is at least next to being its worst absurdity—ludicrously, unless after all I should say superbly, impractical.

Impractical philosophy is in any case; and this, although, reading such a wise interpreter of things human as George Meredith, we learn—is here possibly only one more jibe, carefully concealed, at the philosopher?—that, as the feet are necessary to dancing, so is philosophy to all living.

What can Meredith have meant? Whatever he meant, appreciation or ridicule, in view of the popular regard of philosophy it would hardly be extravagant to picture some specially bold philosopher, as metaphysical and ontological and epistemological and cosmological and even theological as bold, starring on some stage—I will not try to describe its scenery beyond suggesting that on the basis of a five-act play the home, the market-place, the state-house, the laboratory and the parish-house or church might very prop-

erly be represented—and on the other side of the footlights in all their evening regalia the performing philosopher's fellow townsmen or fellow countrymen and their families—successful merchants, great statesmen, distinguished scientists, reverent priests and in the upper regions the lower classes. What a merry time that audience would have and are we now having with them!

And philosophy, whether wise enough to laugh itself or not (for the moment I waive the possibility) is laughable. Its certain unintelligibility—suggesting the fool; its violence to ordinary words of standard meanings—suggesting Mrs. Malaprop or some cousin of that estimable lady; its extravagance of contradiction or paradox—suggesting the would-be popular politician; its habitual importunity amounting often to impertinence—suggesting the book-agent who forces on one something one does not want and, wanting or not, can not afford; and, figuratively when not literally, its lack of decent covering—suggesting discovered and discomfited privacy; all these things only show how laughable, how truly and seriously laughable, philosophy is. And yet—although modesty would forbid me to say this if present company were not always excepted or if the joke were not still very much on the philosophers—all the world loves not merely a lover but also whatever makes it laugh, I mean, makes it laugh really and seriously.

Philosophy the highest comedy! We are beginning to understand what that may signify, at least so far as it concerns those who look on. And what is comedy? No easy question. In trying to answer it, too, I dare not be philosophical. Philosophically I should have to say quite boldly: True comedy is real tragedy, tragedy at its limit, tragedy so sweetly coated as to be enjoyed, in short, tragedy quite out-tragedied. Or, again, employing the same forbidden subtlety: With respect now to its effect true comedy is laughter defying the tears that ought to flow or it is the

laughter of those who have wept until they laughed or are laughing having omitted or forgotten their more natural weeping. Or, just once more, in another vein but still philosophically: True comedy is a synthetic manifestation, under conditions of subjective surprise or unpreparedness, of incongruous elements of life or thought.

Such comic, if not also tragic accounts of comedy aside, however, we all know—observe often not without sorrow—that even a pun has its humor, its comic elements, and for this reason; that although on very superficial ground, in a word on merely verbal similarities, nevertheless it brings together as in a flash objects or ideas that are strange to each other. The meeting of extremes, as when the long and the short of it dance together—excuse the reminder of Meredith again—is the greatest joke of the day, of any day; nay—is there a door handy for my escape? —of eternity itself!

Puns at least, then, make extremes meet and, although their comedy must always or almost always be very light or, to offer a luminous if not lurid illustration, very *puny*—that one is weak enough to act, too, as a homeopathic cure,—nevertheless they fill the bill as to certain essentials. Vaudeville performances are perhaps an attenuation better. Their "syntheses of the incongruous" are certainly sudden enough and the incongruity is obvious enough, but! In truth there is a very large *but*. Even like puns, the vaudeville comedies are all too accidental or too superficial. They rest on no comprehension, no insight, no real depth and breadth of actual human life. The pun is only verbally deep. The vaudeville performance is silly, being only accidentally deep. Yet in both we find the ingredients, however poorly measured and mixed,—excuse the intemperance of my figure—of a potion that will make all who drink laugh. Measure them and mix them aright and the results will be alarming as well as philosophical. Always

the great need is more insight; the discovery, I suppose among other things, of the real tragedy that any comic situation, any meeting of extremes, must always hold. Real comedy, true comedy, the comedy that awakens, not hollow, empty, idle, foolish, but real, honest, serious, human laughter, demands insight; and, merely showing how magnificently the two work together, insight, real, honest, free, human insight has never failed to make laughter; not loud guffawing, not silly grinning, not loose joshing or jeering, but laughter. Very real laughter is sometimes so hearty and so—I mean but will not say—so profound that it never, or at least only very rarely, gets beyond the eyes. Such laughter were even spoiled if heard; a notion that quite accords with the statement of one authority—only I do not remember either his name or his exact words—that the best laughter is that which looks rather than sounds, the laughter, in short, of those who laugh to themselves. But, suppressing now even our own smiles, whatever other excesses we may deny ourselves, we must never again take comedy that has no stick of insight well mixed and generously mixed in it.

And now, besides knowing what comedy is, we are beginning to understand how philosophy is comic or even how it may be the highest comedy. Its insight, if insight it ever have, must be what makes it always comedy and, because with its insight go all those other things, unintelligibility, paradox, impracticability and the rest, the itinerary of this essay, now obliged to cease its rambling, is well laid out.

Quite seriously we have to consider the real humor of insight and of each of its numerous distinguished attendants. This humor, I foresee, as we catch it and come to feel it intelligently will account not more for the amusement of those who laugh at philosophy under such provocation as has been shown already than for a natural and

necessary humor of philosophy itself. In other words, from this point on the philosopher may laugh with us, and, although we shall not allow him to say that he who laughs last laughs best, we may have to admit that the order of one's laughter has something to do with its quality. In passing, furthermore, I would now go so far as to say—showing how my definition has grown on me—that only such philosophy can be true as, in the first place, makes other people laugh and, in the second place, has brought to its propounder a laughter which, however controlled and merely ocular, is at least as hearty and as human as that of any of his fellows. The pragmatist's test, requiring that what is true be that which "works" or "goes," can not hold a candle to this test of provoked merriment.

With regard, then, to the natural humor of insight, of philosophical insight, it must be assumed of course that the philosopher really does see something; that is, to be quite specific, that such well accredited philosophers as Parmenides, Socrates, Plato, Democritus, Plotinus, Aquinas, Spinoza, Hume, Kant and Hegel—I dare not come down any farther, although even in the last century, I feel sure, Mark Twain and Nietzsche were not the only humorists—really had some vision. Making such an assumption we can quickly catch the humor, or the comedy, of insight, for even with little knowledge of history we know that the philosopher has always seen what others have not seen. Sometimes others have said they saw it when they really did not or, perhaps with more truth, that they knew there was something there although they or their eyes, even their mind's eyes, quite failed to discover it, but in either case there is cause for amusement.

When one man stares with enraptured gaze at what other men can not even see, it is high time that somebody smiled, since incongruous things are met together, and the fun is only enhanced by the fact that the seer in the case

would suffer no serious check upon his vision did he tightly shut his own eyes. A blind philosopher, too, has never been as blind as others without the use of their eyes. To adopt a saying from Heraclitus, who, while known as "the weeping philosopher," was not without his merry jests: "Men in their folly are like the blind. Of them does the proverb bear witness that they are absent when present. Having eyes men see not and lacking eyes they see." And Heraclitus himself did not need his eyes to see what he finally saw. So what a veritable nest of jokes! No wonder that a man with so much humor unbent at times and even through his weeping indulged himself in a very little pun, albeit Hellenic: "The bow (*biós*) is called life (*bíos*), but its work is death."

The rich humor of insight is more than a matter of one man seeing without eyes and others not seeing with them. What the insight reveals has this very humorous quality: It is so commonplace as not to have been noticed and so unnoticed as to seem upon discovery almost if not quite wonderful and even miraculous. The very essence of insight is discovery, not of anything outside of life or nature, but of what dwells quite within life or nature, not of what something outside is, but of what this life or this nature really is. So for insight are the always seen and the not seen, the familiar and the novel, the commonplace and the wonderful met together, and could anything be more laughable?

We all laugh at the man who, wearing his glasses, looks for them and he himself, his search at last over, laughs too, but the investigations and discoveries of philosophy are quite similar:

"I would know how I know;"

"I live and I would live as I ought to live;"

"That which I am I will to be;"

"I will that not my will but the will of God or of my

own real self or of what is true and good and beautiful be done;"

"The world really is, not what everybody finds it, but what I think or make it."

Such things and many others like them, very humorous things I submit, transforming as they do the commonplace into the important, the already real into the ideal or yet to be realized,—such truly funny things the philosopher is saying in so many words all the time. They are very essential parts of his stock in trade.

Philosophy in respect to what it sees and says is so different from science. Science deals with what can be isolated and so with what can be studied objectively, methodically, exactly, and described quite logically and soberly, but philosophy with what can not be isolated, that is, set off and out by itself, and so with what is never special or local but is instead universal. Thus science depends on limitation of the field but philosophy would be helpless were the field limited. Science would see what can be seen as this or that here or there and now or then, but philosophy would even see the seeing or be the being for which there can be no such boundaries. The isolable and formally describable or explainable, insists philosophy, can not be the vital; the manifest object of experience can not be either the real experience or the real thing experienced; for vitality or reality are wholes, not prosaically isolable and definable parts.

Dealing, then, with what is too vital to be isolated, too commonplace or too natural and essential to be nicely measured or upon discovery to be in any way regarded soberly, and I may add, too general to be apprehended as the things of space and time are apprehended, philosophy is bound to a peculiar task.

While science can be and must be sober, philosophy can not be and must not be so. To use a flippant phrase

in a very serious way, philosophy is constrained to be intemperate to the point of "seeing things." Imagination instead of direct observation, speculation instead of "eminently respectable" reasoning, poetic thinking instead of prosaic thinking are its proper, however unconventional, methods. Simply it has no choice but to look as best it can and with what saving sense of humor it can and with due sense of the amusing figure it is bound to cut before all respectable citizens, at what is commonly quite invisible. Only a quasi-vision is thus possible to philosophy and its speculations, but how the philosophers have looked at what they have seen so fictitiously!

Just to illustrate how the philosophers "see things": There was once a man, of whom the reader knows and at whom he may laugh or smile as affectionately as he pleases, who lived in a world of things-in-general and had all the relations of his life to these. Would you appreciate his unusual plight? Then think how it would be, how strange, if not how hair-raising, to catch sight of a tree-in-general out there on my lawn—which would in fact have to be a lawn-in-general—with birds-in-general singing songs-in-general from the branches-in-general and, while listening-in-general to the peculiar beauty-in-general of that generic music, to be disturbed by the bark-in-general of some passing dog-in-general. Think of that, I say, and then reflect that Plato, among others, had some such experience—philosophically and to-the-gayety-of-nations-ly.

Plainly philosophical vision calls for humor. Its rapturous gaze at the invisible, its startling discovery of the commonplace and its universal view, its quasi sight of the whole or the general, are all most laughable; so laughable indeed that it is a relief to know how much the philosophers have laughed themselves. The gloomy Heraclitus, as we have seen, was a rich humorist. Socrates had his irony. The dialogues of Plato were loaded with merriment—al-

though not always as choice as might be wished, as when the arguing sophist Thrasymachus is answered with the reminder that he really needs to wipe his nose. And vision, as I keep repeating, has always brought laughter. Seeing beyond accepted forms and standards it has always brought the freedom from these, the license, the unbending, of which laughter is such an excellent expression. But vision, or insight, was said to have a train of attendants, its court-fools, and some of these, to which we may now turn, have been, and still are, inimitable jesters.

Probably I do not need to speak again, certainly not at any length, of unintelligibility. I would only assure you that it is the business, if not quite the conscious duty, of philosophy to be at least reasonably unintelligible. What I mean by "reasonably" any good lawyer may decide, being so much more competent to do so than I. But, as to the unintelligibility, to all that has been said I merely add that what men commonly understand or can understand is relative to prevailing views and tests, whereas philosophy and its vision can count for nothing if they do not imply something radically different from what prevails. So true is this that vision being still shadowed by the old standards is always greatly puzzled itself, having quite as much the character of a *what* as of a *that*.

"Yet my vision," interrupts the philosopher, "although puzzling to me and unintelligible to others, although very irregular, informal, unconventional and alien, is not without supreme meaning. Far better is it to be right and unintelligible than under the law! And even death itself were better than that I should betray my vision!"

Not so heavily serious, Mr. Philosopher, if you please. Your usual heroics are not needed here, for we are now readily sympathetic and at the moment are so affable that we would even prefer you to be unintelligible, enjoying you—such is our present happy mood—much more and ap-

preciating you more, too, in that rôle; that is, if you will be at least reasonably unintelligible!

Closely connected with philosophy's unintelligibility, which might be said to vary directly with its insight, there is a much remarked and much criticized violence to names. "Why not speak the king's English?" says some real man to some—let no unphilosophical person put it in this way—fool philosopher; "Or," going on, "if you must think so differently from real men, why don't you invent a language of your own?"

Good questions these and quite answerable according to their own folly, but I will meet them as soberly as I can. Replying to both at once I say simply that the vital service of philosophy, as necessary to life, you remember, as feet to dancing, must always depend on its strange and even shocking use of familiar words, on different meanings for standard terms.

A certain reader of a certain philosophical essay, that searched matters rather more deeply and freely even than is usual, had no comment to make but this: "What offensive profanity!" and in a sense, insight must always be profane, using many precious words in a shocking way. Small wonder that an unusually intelligent classifier in the library at the University of Michigan shelved a certain book, *A Cursory History of Swearing*, with the *other* histories of philosophy!

But there is profanity and there is profanity, just as there is lawlessness—that of destruction—and lawlessness —that of reform. What really is life or anything connected with life? Such is the philosophical question, and the answer, however profane, must come: "No longer that, however sacred, but this!" The old word must remain too; else there were no point and no challenge. Life—not something Sanskrit or Hottentot—life in good, unhesitating king's English is this startling thing now newly revealed.

Of course men never dreamed of any such marvelous meaning for the term; of course its new use shocks them terribly; but so much more reason that they should be made to look to their speech, not to say to the thought back of it.

Where, however, is the humor? The humor of old names for new things may be seen in the following tale from Mark Twain's *Adam's Diary*. In the Diary, as you know, Mark recounts how Adam and Eve went about the Garden naming the wonders thereof, the strange animals and the rest. They came at last upon a galli-wasp. What should they call it? Adam, usually quick with fitting names, was hopelessly puzzled, but Eve, her woman's intuition no doubt serving her now in good stead, exclaimed: "Adam, let's call it a galli-wasp." "But, Eve," cries Adam, "why call it a galli-wasp?" "Because," came the woman's answer, "because it really looks so much like one." Eve had the vision which naming strange things always requires. The story is known to all and, perhaps too obviously, I have told it in my own way, but it will indicate very well the pleasant comedy of all naming. Also it has had for me its analogies in many of the discoveries of philosophy. Thus, here is one, as significant and humorous as any of the others.

There was once a Greek, Anaxagoras, who was, so we are told, the first to call something he found in the walks of life by the name of mind = *nous*. The thing so called had been in the lives and experiences of his predecessors for years and the word, the name, was a standard word in the language, having been in good usage nobody knows how long. Anaxagoras, however, was the first to apply the name to the thing. And why? Again Eve's reason. Perhaps Anaxagoras had a wife of his own and her woman's intuition to help him out. Of that we can only guess. In any case the reason was unhesitatingly this: Because the thing discovered looked so very much like mind.

But, once more: "This is what life is," exclaimed the hero in our last novel, "I never knew before what it was nor how great it was." "Why?" you might have asked him, and answering he must have joined the chorus of all discoverers: "Because it looks so like the old old thing!"

In a final sum then, the new strange thing that is like some old thing is as near to being the philosopher's stone as any thing I know and if I may hold the figure, it is a stone that owes no small part of its mystic color and luster to the humor of the new naming or of the strange likeness that must always attach to it.

But naming the new things in the walks of life is probably the very simplest way in which philosophy at once shocks and amuses people when it tries to express what it has discovered. Unintelligible as it often is because of its violence to terms, it is made doubly unintelligible by its readiness to utter its wisdom in paradoxes. For the life of insight the descent to paradox is easy.

What really is this thing? Life? The world? God? Self? What is it *really*? The question itself shows that strangers are already standing at the door of one's tent, and the strangers must be met. Yet how? The thing inquired about must be hospitable; it must identify itself with what it has never been, receiving the strangers at least as possible angels. But such hospitality means paradox, the bringing together of things opposed. Strangers start inquiry; inquiry makes thought; thought would entertain the strangers; and the result, in fact if not always in form, is paradox.

Every name, newly applied, always hides a paradox, but all the paradoxes of thought and its discoveries are not hidden. The Greek thought and in the end made the discovery that he himself also was a barbarian. The Jew found himself also a Gentile. Christian meekness, as has often been said, has had some of its best expressions in the

lives of Jews. And in general in the relations of men and in the relations of things thought has had a way of reversing normal conditions. Indeed at least at one stage in its activity paradox has always seemed the only adequate and candid way of expressing what has been seen.

So man was found to be non-human, at least to the point of being a monkey, a quondam monkey; and I do not need to multiply the cases of thought's paradoxical transformations. The thinker can no more avoid paradoxes than a statesman can avoid inconsistency.

Of course the paradox is irregular; it does not belong in well-ordered society and conversation; it violates logical conventions horribly; it is perhaps the philosopher's most striking way of staring into the dark, of looking, as if entranced, at what others can not see; but it is as indispensable to thought, which must be constantly outgrowing its forms and which finds nothing more thoroughly informal than paradox, as—what shall I say?—as life and death are to growth.

That comparison is also a good illustration. See beneath the surface of things and life and death, as also cold and hot, lawfulness and lawlessness, good and evil, divine and human, infinite and finite, become definable in terms of each other. Thought, in short, never fails to make the very strangest bed-fellows.

So, again, the comedy of philosophy is presented to us. If up and down, order and disorder, man and monkey, light and darkness, good and evil, life and death are the same, this world is indeed a stage and the performance—I do not need to advertise it as continuous—is dangerously near to being—what is the phrase?—a side-splitting farce. Only, the issues are serious and, laugh as we must, we always feel, all the more for our laughing, that a vital truth lies hidden in those strange ways or those strange words of men.

In professional philosophy, at least for its ordinary history, the comedy of philosophical paradox began when Anaximander crossed the stage and said in so many words: "All things are nothing"; a declaration that may well suggest the hospitable invitation to dinner *any* evening, obviously equivalent to no real invitation, and Heraclitus continued the performance with all sorts of mystic announcements about good and evil being the same, justice depending on injustice, immortals being mortal and mortals being immortal, and so on almost *ad infinitum* and quite *ad immoderatum risum*. Then came Anaxagoras with his elements or cosmic parts so side-splittingly wonderful as each by being infinitesimally small to contain the whole cosmos and soon after Anaxagoras arrived Socrates whose supreme wisdom lay, as he amused himself much and others some by saying, in his knowing that he knew nothing.

Aristotle, strangely enough, was not a paradoxist, but he relieved the play by being delightfully direct and flat. Quite parenthetically may I speak of him? Flatness, so different from paradox, is after all only another medium for the expression of insight and so another way of not being understood. Thus how profoundly wise it was of Aristotle to assure his fellow men that the way to learn to do anything was to go ahead and do it, that sight or vision was the subtle process by which man apprehends the visible, and generally that as man is able in any way the world about him is correspondingly possible. I have sometimes thought that the following lines by Ben King might have been dedicated very appropriately to Aristotle:

"Nothing to do but work,
Nothing to eat but food,
Nothing to wear but clothes
To keep one from going nude.

"Nothing to breathe but air—
Quick as a flash 'tis gone.

Nowhere to fall but off,
Nowhere to stand but on.

"Nothing to comb but hair,
Nowhere to sleep but in bed,
Nothing to weep but tears,
Nothing to bury but dead.

"Nothing to sing but songs,
Ah well, alas, alack,
Nowhere to go but out,
Nowhere to come but back.

"Nothing to see but sights,
Nothing to quench but thirst,
Nothing to have but what we've got,
Thus through life we are cursed.

"Nothing to strike but against,
Everything moves that goes,
Nothing at all but common sense
Can ever withstand these woes."

But Aristotle in his day could be flat and wise at the same time, for he was free from the peculiar restraints of form and tradition that had forced the vision of his predecessors to express itself paradoxically. Still, if only for their contrast, the Aristotelian tautologies and platitudes have a humorous quality all their own.

Leaving Aristotle, however, the comedy of philosophy of course did not close with him, although I can hardly turn this essay into a comedian's history of philosophy. St. Augustine was a good deal of a humorist. So was Aquinas. So, too, was Spinoza with his one God, or substance, his infinite attributes of that substance, his infinite modes of each attribute and his infinite finite modes of each infinite mode, for there is a point beyond which even infinity is best met with a good laugh. As to Spinoza, too, I am sure that his own humor, quiet as it was and obviously had to be, saved him under conditions that must have robbed most men of all balance of either thought or feeling.

Then there was Kant, but his *Critique of Pure Reason* must speak for itself; and Hegel's humor is known to everybody. Certainly Hegel has saved philosophy from losing sight of the merry paradox for many a day. The thing that was not at once its own negative or other had no interest whatever for Hegel, as forsooth it should have no interest whatever for you or me. We sometimes say of a man that he is one who will not stop at anything, meaning so to reproach him, but according to Hegel there is nothing that anybody ought to stop at. So there you are and being there you are doubtless wondering also, as you promptly should, where—how shall I put it without profanity?—under the sun you are.

But the case is now quite clear. Philosophy is a comedy, even the highest comedy; thanks to its paradoxes but not without some gratitude also to its platitudes and to some other things, general or particular, to its eyeless vision, and its profane speech and its foolish—or wise?—unintelligibility. I have yet to speak of its impractial nature. Still, why should we spend time on that? Philosophy, remember, is as necessary to life as feet to dancing, and dancing is what one practices, not feet. Philosophy always impractical? Of course! What else would you have? And the philosopher's salvation is the laughter for which he is so ready whenever he really sees things and with the comfort and support of which he can do anything that *is* practical—even rendering unto Cæsar that which is Cæsar's. The compromises which practice must ever force upon vision are no longer compromises but ideal working measures, when they are taken with proper humor.

With needless modesty, doubtless, I have said nothing of the philosopher's lack of clothes; nor was I going to say anything. The lack is so obvious and others might be embarrassed, even if the philosopher should not be, to have such a matter discussed. Mention ought to suffice,

if even mention be not too much. But the trouble is that the philosopher exposes other people no less than himself. Of course the nude in art has interested many—for its sensuality—for its purity—and the nude in science has also had its students who have commonly known it by another name, the natural, the objective, the physically or materially true and real. But the nude in philosophy—the exposure that philosophy makes, or at least thinks to make, of all that lies beneath the outward appearances of men's lives, making those appearances at most only the most gauzy draperies—is certainly not less likely to catch and hold the gaze of curious mankind, looking as men always will at the sordid and material, at the heroic and spiritual, whenever and wherever exposed.

Still, if I keep on, I shall have everybody blushing for his disclosed smallness or for his uncovered greatness and tears instead of the intended laughter may spoil my comedy just as it is about to draw to *such* a successful close. I have wished only to make evident the humorous discomfiture of exposure for people that have been thinking their inner motives and ideals, their hopes and their loves, their fears and their hates, at least decently clothed. What a jest, I mean what a fabric of gauze, any institution is!

And at the court of philosophy—did I forget to say, of course with Plato, that the philosopher is the only natural king?—there are others beside those mature jesters whom we have been hearing. Thus there is a swarm of youthful and mischievous pages. The philosopher's formula, for example, that means everything, the whole universe in fact, yet really is applicable to absolutely nothing. And—is it safe to let this fellow in?—the philosopher's pecuniary wage, which he gets for wisdom that is so unconventional as to be quite without price. But here embarrassment, if not resentment, overcomes me and I refuse

to go on, exposing the philosopher to another of these rogues!

Philosophy *is* comedy, the highest comedy; and I can brook no rival for philosophy in this distinction, save possibly one. Should somebody insist that religion showed a still deeper humor, that the God who made the rain, for good or for ill, fall alike on the just and on the unjust or always, not merely on Calvary, brought reformer and malefactor to the same death just as earlier he had brought them into the same life of violence to the law, must be the supreme humorist and should therefore never be worshiped without the possibility of a smile on the face of his worshipers nor pictured without a smile at least in his all-wise eyes, in all probability I should make no protest. Religion is the divine comedy.

But surely, insists some one before I can get away, surely philosophy is not merely comedy. Of course not. Nor is comedy. The meeting of things incongruous always brings tragedy too. Have you already forgotten those definitions of comedy that I "dared not give"? In the history of national literatures tragedies and comedies very properly have arisen together—at such time, be it remarked, as when little man has run up against big nature and has succeeded in showing how much bigger than nature he really was!—and have reached their extremes *pari passu*. But through the pages of this essay—why must I still have to tell you that it is time to laugh?—I have simply chosen to laugh with philosophy and have asked you to join in the merriment. Some day I may boldly invite your tears on the same evidence, but not now. Enough now that there can be no vision without laughter.

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THE MONISM OF THE GERMAN MONISTIC LEAGUE.[1]

IT has been the prerogative of ancient and modern philosophers and theorists to delve into the mysteries, the first cause, origin and purpose of all things, phenomena visible and invisible. What is the result? A never ending chain of arbitrary terminologies, an endless war of pen and sword, a bitter strife between science and religion stubbornly persisted in by powerful, good, brave and illustrious men of both parties, and claimed by both. The consequence is that hitherto we have not been able to answer definitely questions like the following: "What do we know of the origin and nature of things?" "Which laws determine the course of nature, the origin and end of life?" Whatever physics, chemistry, astronomy and other sciences have accomplished in explaining these and similar queries, a point is finally reached where human understanding, reasoning and research work prove deficient. Thus, toward the end of his life, Du Bois-Reymond summed up his lifework of indefatigable research work in these few modest words: "We know nothing about a beginning, first cause and end of all things, and we never will find out."

At any rate, the attempts made by ancient philosophers, especially those of India, Arabia, Egypt, Greece and Rome,

[1] This article consists mainly of translations from authentic sources dealing with the subject. In order to adapt the teachings contained in the Catechism to American conditions whole sections have been eliminated and others modified. They differ from the belligerent attitude of the German *Monistenbund*.

to fathom the secrets of nature, have left remnants on the strength of which their modern successors have constructed new theories and hypotheses by extracting truth from nature itself, previous important observations and discoveries leading to new ones. Thus the way is being paved towards finding and determining nature's laws and bringing nature's forces into service for the benefit of humanity. This unremitting research work into the minutest as well as into the remotest parts of the universe is constantly confining the realm of the mysterious and inexplicable to more narrow limits and is paving the way for the spreading and better appreciation of monism.

Monism holds that there is but one form of reality, whether that be material or spiritual, whilst dualism attempts to explain facts by reference to two coexistent principles. But the aim of knowledge is explanation, and the dualism and pluralism which acquiesce in recognizing two or more distinct forms of reality have so far failed of explanation, and modern monism in all its forms is forging to the front, launched and upheld by some of the foremost men of to-day.

Monism, as first expounded by Plotinus (204-270 A. D.) one of the most important representatives of neo-Platonism, ignores personal individuality and volition and merges all finite existence in the featureless unity of the absolute. Thus the protest against the old form of monism was started. Turning to the historical forms of the theory, Plotinus may thus be classed as a mystical monist, whereas Spinoza (1632-1677) may be called a materialistic monist with an inconsistent touch of mysticism and a certain concession, more apparent than real, to the spiritual side of experience. Hegel (1770-1831) is an intellectualistic monist, explaining matter, sensation, personal individuality and will as forms of thought. The doctrine of Schopenhauer (1788-1860) and Eduard von Hartmann (1842-

1906) is a monism of cosmic will which submerges the individual as completely as Hegelianism, though in a different manner.

The latest form of monism, founded by Ernst Haeckel (born 1834) is based on the results obtained and discoveries made by modern scientists and philosophers, men like Copernicus, Kepler, Newton, Goethe, Kant, Laplace, Darwin, himself and a host of others. It stands by the conviction that the correct philosophic attitude is to accept at least provisionally the main distinctions of common sense, thus opening the avenues leading to the monistic conception of the universe to all who wish to gain an insight into the modern discoveries and views relating to the "world-machine" as Carl Snyder put it.

On this basis, the Monistic League (*Monistenbund*) of Germany was formed in January 1906, and since then branches have been established in many cities of Germany, Austria, Switzerland and Holland. Periodicals like *Das monistische Jahrhundert* have been created, great meetings were held in the largest halls of Berlin and heated public discussions were the immediate result. The orthodox churches and conservative classes became so alarmed at the threatening aspect and dimensions of the new movement that they forthwith organized an opposing body named *Keplerbund* (Kepler League) for the great astronomer. The latter society is composed of the more conservative scientists and theologians, and its immediate object was to attack Professor Haeckel's scientific reputation and standing, to undermine and counteract as far as they could his influence over his followers at home and abroad.

President-Emeritus Eliot's pronouncement on the "religion of the future," which he says will be a monistic religion, is only one of the signs of the times, showing the irresistible tendency in modern thought and life toward a monistic conception of the constitution of the universe.

a monistic philosophy or religion. All this is the inevitable and natural outcome of the rapid and revolutionary progress of modern science and philosophy. Dualism and pluralism are decaying at the very roots. A monistic, a more scientific, conception of things constituting the universe, is rapidly taking the place of the old orthodox dualistic notion. Modern science and philosophy are revealing the world to us as a spiritual commonwealth, self-existing, self-governing and self-directed.

At the beginning the German movement laid the greatest emphasis on the religious and purely theological aspect of monism as an anti-dualistic theory of the relation of God to the world or of spirit to matter. Within recent years, however, it has paid attention to ethical and social aspects, to individual and social life. Thus the new, complete and thorough-going monism proclaims man to be merely the most highly individualized form of the spirituality of the world. The German League has been organized to further the evolutionary theory of the world and to resist reaction in church and school, state and society. Thus its mission is to purge and purify man's views of life of every superstition and hypocrisy; to elevate man's conception of himself to the plane of a true and natural dignity, to arouse an enthusiasm of humanity, to give man an insight into the world as a vast, living, striving, conscious organism, of which he is an integral part, realizing the "kingdom of heaven" during our life on earth.

The Munich (Bavaria) branch of the League celebrated the sixth anniversary of its foundation in the summer of 1912, and in announcing the celebration it proclaimed the following guiding principles:

"The monist is thoroughly imbued with modern ways of thinking, by ignoring the existence of a supernatural being and force creating and governing the universe and all its parts. He strives to understand this from natural

causes as taught and explained by contemporary sciences. Rejecting all beliefs in ghosts and miracles, he is convinced that all that happens in this world and all that ever did and will happen, is, was and will be the result of natural causes; he is convinced that whatever phenomena cannot now be explained satisfactorily will be at some future time as the result of untiring experiments and researches made by scientists, specialists, economists in the fields of nature and the science and conduct of life. According to this view the monist arranges his individual and communal life according to reason, existing conditions and laws.

"To a monist, education culminates in exercising and fulfilling duties toward himself and his environment, including not only his immediate family, community, state and nation, but also the generation to come (eugenics), thus replacing the prospect of a reward in the future, held out and preached to the credulous millions. Thus the monist's ideals of life's activities grow out of and culminate in his conception of conditions viewed with a spirit of fairness and without prejudice.

"The monist's very insight into the natural connection of cause and effect arouses in him that intense feeling of responsibility toward ameliorating and elevating mankind that creates in him the continuous desire to improve and enlarge his views, inspiring him to an unceasing endeavor toward refinement and perfection.

"Keeping his mind free from fanaticism and dogmatism, the monist defends his scientific mode of thinking against the traditional representation; he stands for unconditional freedom in matters of belief, at the same time respecting the personal conviction of others, hoping that in the end not the current creed or faith, but the correct way of doing things will determine man's worth in society in this age of progress.

"Monism is not a creed, religion or system fixed by

dogma, but it is simply an intellectual movement growing out of man's desire to base life's aspect and the conduct of life on the grand achievements in modern science and to live the life of a man actuated by common sense and imbued with obligations toward his fellow men.

"Being based on the experience gained by a thorough comprehension of nature, especially the laws of energy and the course of evolution, scientific monism is gradually replacing the traditional dualism which separates the unseen from the visible world, nature from mind, soul from body.

"Monism rejects that prevalent mode of dualistic thinking which finally arrives at and adheres to traditional conceptions of faith and supernatural interferences in nature's workshop.

"Monism regards *man* as a product of natural development, as an organism evolved from primitive sources through his own inherent powers, aided by his surroundings, and able to fit himself for continuous improvement by observing the rules for the conduct of life.

"Monism defines the soul as the sum total of all mental and intellectual functions of an organism or a union of organisms. In conformity with established psychology it does not consider the soul separable from the body and for that reason rejects its immortality. Furthermore if we substitute the word 'character' for soul, the definition given the latter may also be applied to the former. With the death or annihilation of the individual organism these properties or attributes simply cease to exert themselves, just like any other quality or trait that characterized or gave life to the individual.

"Monism regards the various religions and creeds as a product of the modes of conceiving or trying to understand and interpret nature, visible and invisible, a mental process that influences and characterizes different people at different times and places under unlike conditions. At

the same time, monism tolerates and recognizes the value of religion and the importance it exercises in educating the young and ennobling mankind, but does not endorse the ultra-natural beliefs forced on the minds of the faithful by men of undoubted sincerity, high attainments and zeal.

"Monism does not pretend to remove all doubts, nor to be able to solve all the riddles of life, but it represents a view of life based on the achievements of research work and discoveries in astronomy, geology, anthropology, biology, chemistry and allied sciences, thus preparing mankind for a new era of intellectual and moral progress and enabling intelligent men and women of all classes to think and to act for the welfare of all.

"In trying to apply monism to practical life, we may ask: How does the monist regulate his private and public mode of living? To this monism replies: Regulate your life so that the prosperity of the community and of mankind is assured by keeping the individual in a healthy and vigorous condition, at the same time looking toward a thorough adaptation to surroundings and to the propagation of healthy offspring. Let there be no standstill, no matter how well you have developed, but strive forward toward progress, renewed activity and constant productiveness. Persuade every accessible individual to apply these rules of life, and monism is destined to reach the greatest number of individuals, saving them from degeneration, and to reclaim those that are not living up to the precepts of nature and the community."

In Germany, the birthplace of the new monism, the "Monistic League" attempts to realize freedom of conscience guaranteed by the constitution, thus permitting every citizen to profess his opinion freely in all the states forming the empire. In conformity therewith, the League tends to replace in the schools the religious-moral educa-

tion by a *moral education* based on the results of discoveries and achievements of modern science and by teaching civics so that the future citizen may learn to interpret and exercise the laws as conditioned by and related to the surroundings, community, state and nation.

Thus the inventive mind of a German enthusiast, Dr. L. Frei, evolved a "Monistic Catechism," of which Professor Haeckel says: "I have read with keen interest the catechism teaching the monistic aspect of the world; it covers the ground well and is bound to gain universal approval and success."

A MONISTIC CATECHISM.

The Universe.

1. What is the universe or world?

To primitive people the earth upon which we live was and still is a microcosm, a world in miniature, with heaven stretched over it. According to the ancients the macrocosm, all universe, centered in the earth, around which moved not only sun, moon, and planets, but also all the other celestial bodies.

Thus the earth was considered the center of the universe, until Copernicus (1473-1543) and others defended and confirmed the theory that the earth, the moon and the other planets revolved around the sun, receiving also their light from this central body. Subsequently Kepler (1571-1630) discovered the laws governing the motions of the planets, Newton (1643-1727) calculated the mass, density and volume of celestial bodies.

Kirchhoff (1824-1887) and Bunsen (1811-1899) discovered and developed spectrum analysis, now called spectroscopy, by means of which the chemical constituents of celestial bodies can now be ascertained when comparing

their spectra with those of the various elements existing on our earth.

In short: Macrocosm, universe or world at large, includes all celestial bodies as well as all substance filling out the space between them.

2. How old is the world?

According to biblical belief, the world has been in existence about 6000 years, but natural science tells us through its silent but truthful and dependable witnesses that the world has neither beginning nor end. It has never been created, and all parts composing it will remain in some form or other as will be explained forthwith.

3. What laws govern the universe?

The untiring efforts of sages of antiquity and modern times have finally culminated in determining two laws governing the universe. The first one, discovered and framed by a Frenchman, Lavoisier (1743-1794) teaches the conservation of matter: "The sum of all that constitutes the universe remains the same in spite of all changes of form. Not a particle of matter is lost, wasted or added."

The second law, attributed to several men of science, but finally formulated in a definite form by Julius Robert Mayer (1814-1878) and Hermann Helmholtz (1821-1894) is the law of the conservation of energy: "The sum of all forces acting in and propelling the universe producing all phenomena remains the same." Heat may be changed into motion, the latter may be converted into light, sound or electricity; correct measurements show that the amount of energy apparently spent has remained, although represented in different form, and that no particle of force or energy in the universe is lost, wasted or added.

These two fundamental laws dominate not only the

inorganic, but also the whole of organic nature, the life of plants and animals as well as the existence of man.

4. What is the world governed by?

According to the previous chapters, it is evident that the world governs itself.

Science does not recognize (because it cannot locate) a being outside of the universe which governs the universe.

5. Has there ever been a beginning of the world?

According to the Bible and to similar books and traditions, among civilized and uncivilized people, the universe was called into existence by one or more supernatural beings. Yet some of the ancient philosophers with advanced ideas taught the birth of the earth from primary elements or forces, and even some of the new cosmogonies based on the theories laid down by Kant and Laplace cannot cut loose from a beginning of the world. But science teaches us that cosmic time and space are infinite. The world has had no beginning and will have no end. All matter has been and will be forever in constant motion and is subject to continuous changes. Thus new bodies are being formed by contraction, others disintegrate forming the basis for new organisms.

6. Therefore, are we justified in asking: What has the world been made of?

No, for according to incontestible truths arrived at as mentioned previously, nothing can be created from anything not existing in spite of all theories, dogmas, elusive explanations and elucidations invented and taught by otherwise learned theologians and Bible critics; the natural laws prevail, according to which the substance forming the universe never had a beginning and never will have an end.

7. Will there be an end of the world?

No. The energy of the world is constant. There will never be a maximum nor a minimum of energy, and when two atoms or two celestial bodies merge, heat is liberated and converted into a corresponding amount of energy. The universe, therefore, is the only *perpetuum mobile*.

8. How was the beginning of our earth?

Neither the earth nor the other parts of the vast universe were created, but the earth, as well as the other planets forming part of our solar system has separated from the sun, first becoming a nebulous ball, cooling off by and by, at the same time emitting heat, until a hard crust was formed. The steaming atmosphere surrounding the earth became lower and finally covered the surface with water, and organic life on earth became possible.

9. How did organic life come to earth?

Not through an act of creation, but it very likely evolved from inorganic matter forming albuminous, gelatinous, carbonaceous compounds that became animated and turned into organisms consisting of cells. This is called spontaneous generation by modern scientists and is going on all the time. There are, however, various theories trying to explain the origin of life on earth as transplanted from other celestial bodies, but they take us to still more remote ground, reverting to a chain of questions: "How did organic life originate *there*?"

10. Where do our plants and animals come from?

They have gradually developed from the one-cell organism. This truth has been finally established by the untiring researches of Lamarck, the Frenchman, and of Charles Darwin, the Englishman, who thus became the founders of

the modern theory of evolution, teaching that all organisms have been evolved from the next lower ones. Whilst the details of the whole process of evolution will forever be inaccessible to us, evidence gained from research work goes to prove that the theory of evolution comes nearer solving the riddle of organic life than any other theory, antiquated books of "wisdom" or traditions of mystic origin.

11. Is there an essential difference between organic and inorganic nature?

No. Natural science recognizes no dualistic, but only one monistic principle in nature, for the same law of substance that governs organic life is also the cause in the changes of inorganic bodies. A difference exists in characteristic chemical-physical properties, especially the ready decomposability of the albuminous and carbonaceous compounds which cause the phenomena of motion, distinguishing living organisms from inorganic bodies.

12. Is it necessary to attribute the processes of nature to supernatural causes?

No man of science nowadays will explain the phenomena of nature by taking refuge in a supernatural cause. Physical and chemical laws obtain in nature's workshop. Only a few scientists still cling to supernatural causes in explaining organic life; most of them respect the general laws dominating organic beings, as well as inorganic bodies. Thus, instead of asking to what end a body exists we try to find the laws governing its existence.

13. Are design and perfection dominant in nature?

Not at all. However, according to the theory of evolution as laid down by Darwin and his disciples, it became evident that a perfection of organisms is attained solely through self-activity of every single part, a principle called

teleological mechanism. But even after an organism has adjusted itself to conditions, its perfection would not be a permanent one, but subject to changes influenced by many conditions, such as environment. Daily observation in the animal and plant kingdom prove this imperfection by producing organs poorly developed, useless, rudimentary, and even dangerous to the propagation of its kind. According to this there will never be perfection in nature.

14. Is there a moral order of the universe?

Nothing but a negative answer may be gained through a perfect understanding of the preceding chapters. There being no room for a moral order in the physical and chemical constitution of the universe and in the history of the organic world existing for countless years, there are no other laws prevailing in the history of nations than the all-dominant precepts of nature. The struggle for existence is not fought out and decided by the moral order, but by the physical and intellectual excellence, activity and superiority of the individual.

15. Is there room left for a "Providence"?

With the elimination of a moral order established on uncertain ground and attributed to mythical personalities vanish all traces of a providence, which is but the fancy and creation of man who considers himself the center of this vast universe. However, one who understands nature thoroughly knows also that the life of the individual is dependent on mechanical causes and conditions.

Man.

16. How did man come into existence?

Man was not formed of clay and equipped with an immortal soul by a creator, but has developed gradually from

the vertebrate animals, lastly and very likely from the group of primates.

17. What position does man occupy in nature?

After it has been proved that our earth is not the center of the universe, but only a minute part of it, it has also been shown that man is not a godlike creature, separating him from the rest of the organic world, neither is he the predestined center and ultimate aim of all life on earth, but only a link in the chain of living organisms, no matter how eminently the superior development of his nervous system enables him to occupy a dominating position among the other organisms.

18. What has man in common with animals?

The animal body, as well as the human, consists of millions of little cells combining into a great variety of tissues and organs, all of which perform reciprocal functions. Like all quadrupeds he has four limbs, consisting of upper and lower arms, upper and lower legs, wrists and tarses, metacarpal and metatarsal bones, and bones of fingers and toes. Muscles and nerves, joints and ligaments are similarly constructed. Man is to be classed with the mammals on account of having mammary glands. He is covered with more or less hair. In short, all organs are built on the same principle in man as in animals. The main distinguishing features placing man nearer to the primates than to any other living animal form are the formation of hands and feet, consisting of five members each, all covered with nails, the position of the thumb, the uniformity of the four kinds of teeth, the simplicity of the pear-shaped uterus and the structure of the brain. Man's nearest progenitors among the apes are very likely the primates of the old world, both showing remarkable similarities of the structure of the bones as well as of the

organs of the body. Single bones discovered in the oldest diluvial stratum on the island of Java have been put together to construct a hypothetical *pithecanthropus erectus,* the nearest missing link between man and ape. Other links have been discovered, and are still being looked for, in other parts of the globe.

Occasional reports from the interior of dark continents about primitive people discovered show that missing links are continually in the making, but are hidden from view in inaccessible parts of the globe.

19. Is the embryological development of man different from that of other animals?

No, it is essentially the same. The fusion of the spermatozoon, the reproductive cell of the male, with the ovum, the corresponding cell of the female, develops one resultant uninucleated organism or cell which is called the zygote. This process of fusion between the two kinds of reproductive cells, which are called gametes, is called conjugation, fertilization of the ovum, and its result is the establishment of a new individual.

20. What does the physiology of man teach?

It teaches that man belongs to the great group of vertebrate animals, for in the first stages of development the human embryo is very similar to that of other vertebrates. It may be here noted that the great embryologist Karl Ernst von Baer was the first to call attention to the remarkable agreement between the development of the individual and the development of the ancestral line to which the individual belongs. He showed that in every organism, as well as in its component parts, there is a gradual progress from the simple to the complex, from the general to the special. As Haeckel puts it: "Ontogeny is a recapitulation of phylogeny, or, somewhat more explicitly, the se-

ries of forms through which the individual organism passes during its progress from the egg-cell to its fully developed state is a brief, compressed reproduction of the long series of forms through which the animal ancestors of that organism, or the ancestral forms of its species, have passed from the earliest periods of so-called organic creation to the present time."

Thus, observation shows, as the theory of evolution demands, that the germs of all animals are, at the outset, exactly like each other; but in the process of development each germ acquires, first the differential characteristics of the subkingdom to which it belongs, then, successively the characteristics of its class, order, family, genus, species and race. For example, the highest mammal, man, begins his corporeal existence as a simple germ-cell in form and general appearance like an adult ameba, and utterly indistinguishable from the germ-cell of other vertebrates. As development progresses, the embryo gradually becomes more and more differentiated. In its earlier stages it may be recognized as the embryo of a vertebrate, but it is impossible to tell to which class of vertebrates it belongs. So far as appearances go, it may be that of a fish; a reptile, a bird, or a mammal. Subsequently it exhibits the characteristics of a bird or a mammal, but the order to which it belongs is disclosed only at a yet later period. At a still later stage, after manifesting the characteristics of the family, genus and species of which it is a member, it acquires the distinguishing attribute of its race.

21. Which animals resemble man most?

Considered physiologically, man is nearer related to apes than to any other mammal. The similarity consists in the structure of the bones, the mode of living, the motions, the functions of the organs of sense and taking care of the offspring, the secretion of the glands, the functions

of the heart and of all other principal organs. Even the articulations of the primates may be considered an initial step to human speech.

Retrospect.

Whether or not the first beginnings and germs of organic life have come from other celestial bodies or have developed in the manner described in sections 8 and 9, there is up to this day taking place a perpetual introduction and development of newly formed organisms, all of which have developed and are still being developed at different places under most varied conditions and are the prototypes of different types or groups of individuals, tribes and classes as is shown in fossils as well as in others which have never come to light, commonly termed missing links. Other organisms have failed to adapt themselves to new conditions and have become extinct.

Applying this mode of reasoning concerning life on earth to the origin of mankind we may safely assume that *all men* are *not descended from one prototype,* but that each group or each race has developed from a progenitor of its own at different times, in different places, in different zones under the most varied conditions.

Consequently those people ought to feel relieved who have believed that all human beings of all colors and types are descended from one Adam and Eve. So we may be more generous in the future by dealing out a separate Adam and Eve to each type or race of man.

22. Is there an essential difference between the soul of man and the soul of animals?

The difference is not in kind, but only in degree.

23. What do we call "soul"?

According to notions received from the ancients the

soul is separable from the body. However, modern science, finding expression in monism, defines it to be the *sum total of all manifestations* exercised *by the living organism*, thus being a synonym of character, propelling, driving force or energy governing the whole universe down to the minutest atom.

24. Where is the soul located?

The manifestations of the vertebrate, including man, meet in the central nervous system, finally in the brain. In invertebrate, many-celled animals, the soul functionates mainly in the ganglia which are connected by chords.

25. Do only the many-celled higher and lower animals possess a soul?

No—for if all higher organisms have developed from lower forms the difference in the quality of the soul or the manifestations of life is one of degree only and consists in the lower forms in sensitiveness to incentives from the immediate environment, the discharge and exchange of reciprocal emotions, the instinct of self-preservation and propagation of its kind. Noticing these manifestations in the most primitive, one-celled animals and plants both these organisms may as well be credited with a soul, which is inherent in the cellular body or protoplasma.

26. How, then, may these manifestations of human and animal organisms, the soul, be traced and demonstrated?

By tracing them from the highest organisms down to the simple cell body in the following manner: From the known sensitiveness characteristic to man and the highest vertebrates we come down to the unconscious sensitiveness of the lesser animals, then to the primary differentiation of the organs of sense, further down to the organs indifferent to the senses as found in the lowest many-celled and

the higher one-celled organism, finally arriving at the sensitiveness of the single cell body.

27. What does this ontogeny and phylogeny of the soul teach us?

The former takes us back to the simple cell soul. From there we reach a union of unconscious sensations and motions in the round cell-clusters of the unicellular colonies corresponding to the nucleus of the furrowed egg of the multi-cellular individuals. In all cases, however, whether the cell-unit lives freely as a unicellular organism or forms an integral part of a multicellular individual, it exhibits in itself all the phenomena characteristic of a living being. Each cell assimiliates food material, either obtained by its own activity, as in the majority of the protozoa, or it is brought, so to speak, to its own door, by the blood stream, as in the higher metazoa, and builds this food material into its own substance, a process accompanied by respiration, assimiliation and excretion and resulting in growth and development. Each cell exhibits in greater or less degree "irritability" or the power of responding to stimuli; and finally each cell, at some time in its life, is capable of reproduction. It is evident, therefore, that in the multicellular forms all the complex manifestations of life are but the outcome of the co-ordinated activities of the constituent cells. The latter are indeed as Virchow (1821-1902) has termed them "vital units." It is, therefore, in these vital units that the explanation of vital phenomena—including "soul"—must be sought.

28. Is the brain of man absolutely different from that of animals?

In degree. Generally speaking, the great brain, or the cerebrum and the hind brain or cerebellum of the mammals are more developed than the medulla oblongata, the

transitional part between the spinal cord and the other two parts of the brain proper. The most primitive forms of mammals still in existence have a brain very much like that of the amphibia and reptiles found in the oldest formations of our globe. The brain was fully perfected in animals living during the older tertiary formation, whilst during the recent, post-glacial formation, it reached its highest perfection in the primates and finally in man. The differences in the structure of the brain and the corresponding soul-life of man and the anthropoid apes are smaller than between the latter and the lesser or primitive apes and prosimiae.

29. Has only man sense?

Not at all. The association of ideas brought about unconsciously in primitive animals is effected more consciously by the more developed and so-called higher classes of animals and finally takes the form of simple ideas leading up to concrete association of ideas. The highest perfection is reached in man, who is endowed, through a chain of abstract association of ideas, with reason, the faculty or process of drawing logical inferences from premises.

Thus we speak of man as essentially a rational animal, it being implied that man differs from all other animals in that he can reason. It is, however, exceedingly difficult in this respect to formulate an absolute distinction between man and animal. Observation undoubtedly suggests that the latter has a certain power of making inferences. Between the higher animals and the lower types of mankind the distinction is so delicate that many psychologists argue that the difference is one of degree rather than one of kind. There can be little doubt, however, that inference by man differs from that of the brute in respect to self-consciousness, and, though there can be no doubt that some animals dream, it is difficult to find evidence for the presence of

ideal images in the "minds" of any but the highest animals. In the nature of the case it will be impossible to arrive at satisfactory conclusions as to the rationality which may be predicated of animals.

30. How about the much talked-of freedom of the will?

This human attribute as preached both by believers and unbelievers cannot hold out against the judgment of pure reason. Every activity and utterance of the soul as well as every act of the will is limited and conditioned by the organization of the individual on one side and by the influences from without on the other. The freedom of the will is only apparent and everybody acts according to the character or kind of pursuits acquired or inherited from progenitors. Circumstances decide at the impulse of the moment, but are limited by laws governing emotions, the strongest one usually prevailing.

31. What is thought of the immortality of the soul?

The third article of the Apostles' Creed reads as follows: "I believe....in the resurrection of the body and life everlasting." But belief in the immortality of the soul is just as untenable as belief in the freedom of the will. It is not even a constant tenet of all higher forms of religions. There is no mention of it in the Books of Moses, nor in the older books of the Old Testament written before the Babylonian Exile. The religions of Buddha and Confucius do not mention it. Then the belief is not inherited in man. Many primitive, uncultivated people know nothing of it, neither the Veddhas of Ceylon nor other aborigines of India, Australia and both Americas.

Belief in the existence and immortality of the soul has developed by pondering about life and death and especially through the dualistic conception of the human organism. However, against the belief of the immortality of the soul,

the resurrection of the body and an eternal life science makes the following claim: The soul is not an immaterial body with extraordinary properties, as mentioned before, but it is the sum of emotions characteristic of the constitution of the parts of each individual, especially of the central nervous system and therefore ceases to function at the expiration of the individual; moreover, whereas chemists and astronomers have discovered distant bodies and have ascertained their constituent parts, no scientist has ever succeeded in discovering or locating former inhabitants of earth or any of their component parts.

The Spiritual World.

32. How does man look for truth?

In a twofold manner: By learning to find out and by believing what is taught him.

33. What are the sources of our knowledge?

Impressions which we receive from different sources through our organs of sense and which are associated with previous knowledge gained by aid of the reasoning faculty the seat of which is the brain.

While we do not know positively the first and innermost causes and principles underlying all things we accept as true and real whatever we perceive through our own organs of sense and whatever has been proved by or is based on established scientific facts, observations and calculations.

34. What do we mean by belief or faith?

Adhering to ideas, perceptions, notions and traditions the truth or existence of which has or has not yet been proved and established.

35. Is there a belief or faith in science?

Certainly, there is and there has to be, for it is indispensable to all scientific and research work undertaken under the guidance of established and proven facts. It will adhere to all theories and hypotheses based on a number of deductions and explanations until the latter may be disproved or displaced. . . .

51. Is there room for a creed founded on pure science and natural philosophy?

Yes, it would be a creed unifying the conception of the spiritual with that of nature substance. More than a thousand years before Christ, the first seeds of a unification have been spread in India, Egypt, China and Japan. Some of the Greek philosophers have been imbued with the spirit of a philosophic religion or religious philosophy.

52. Does monism satisfy reason and the human mind?

It ought to, because it is based on secure, tangible and visible foundations laid throughout the universe, on facts, events and phenomena partly anticipated, not fully understood by previous generations, but finally proven beyond a doubt by exact science, modern discoveries and researches, achievements refuting at the same time old traditions and beliefs as related in documents and books forced on us as being inspired. Unbiased and unprejudiced people ought to feel relieved now, the road having been paved toward a better and a clearer understanding of nature, enabling all of us to grasp and interpret the problems of life, the ideals of truth, usefulness, morality and beauty.

53. How may we attain the ideal of truth?

By striving to understand and to learn to connect natural phenomena with their causes and effects.

54. How may we attain the ideal of morality?

By following the golden rule first enunciated by Confucius 500 years before Christ in these words: "What you do not like when done to yourself, do not do unto others," or expressed directly: "Treat others as you expect to be treated."

This is the plainest, straightest and most effective policy leading to an exemplary, virtuous life.

55. Where does the monist look for his ideals of beauty?

In the beautiful forms of nature and in the products of human skill as far as the latter are true imitations of nature and adapted to some purpose or end.

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"INTERLINGUA" AND THE PROBLEM OF A UNIVERSAL LANGUAGE.

IT might be thought that the construction of an artificial language was a product peculiarly characteristic of our mechanical age. The very notion calls up an image of august congresses with bespectacled professors haranguing, of sheaves of printed circulars, of motions proposed and rescinded, of heat and recrimination. As a matter of fact the idea goes back to the dawn of modern science. Descartes played with it: "It will help peasants," he said, "to judge better than philosophers now can of the truth of things"—a claim which is perhaps not so far-reaching as it looks at first sight. It engaged, as is well known, the powerful and versatile mind of Leibniz. But I do not propose to give here an account of the older projects previous to the efflorescence of language-making which took place in the latter part of the nineteenth century, and must refer readers who desire information on this subject to such works as John Venn's *Principles of Empirical or Inductive Logic* (1889), Couturat's *La logique de Leibniz* (Paris, 1901,), Couturat and Leau's *Histoire de la langue universelle* (1903), Dr. Alberto Liptay's *Eine Gemeinsprache der Kulturvölker* (1891), and W. J. Clark's *International Language: Past, Present and Future* (London, 1907). Nor have I space fully to describe even the modern movement. My object is merely to examine the merits of one particular universal language, that called "Interlingua,"

of which Prof. Giuseppe Peano, of Turin, the founder of modern mathematical logic, is the most prominent advocate.[1] But in order to understand the nature and objects of this language, it will be necessary, first, to take a summary survey of the process by which it has been evolved from its predecessors, of which the first was Volapük.

* * *

Volapük, now more effectually dead than Greek or Latin, without the sweet savor of either, had a brilliant but short career. It was the creation, like its successor Esperanto, of one man, having been invented by J. M. Schleyer (now Monsignore), a clergyman at Linzelstätten in Baden, who promulgated it in 1880. Its success was rapid; a few years saw the establishment of hundreds of Volapük societies in all parts of the world, and at one time there were 25 periodicals printed in Volapük. Its decline is to be ascribed largely to its highly artificial and arbitrary vocabulary, and to the competition of Esperanto (1887), a far better language, which combined the merits of Volapük—the regularity and simplicity of its grammar—with a less repulsive vocabulary. The name Volapük itself illustrates its chief defect; it is a mysterious deformation of *Weltsprache*. The grammar required all substantives to begin and end with consonants, and the memory was burdened with barbarisms like *fablüd* (= fabrik), *tlup* (= troop), and *blod* (= brother).

The Volapükists invited all friends of the universal language movement to an international congress, held at Friedrichshafen in 1884. At the second congress, held at Munich in 1887, a Universal Language Academy was founded, with the objects of preserving unity and perfect-

[1] This paper was undertaken at the instance of Professor Peano himself, who welcomed it as a means of bringing Interlingua before the public of the United States. But of course Professor Peano is not responsible for any of the views or statements contained in it, with some of which he would doubtless disagree.

ing Volapük, and it is from this body that the "Academia pro Interlingua," of which Professor Peano is director, is descended. The first director of the Academy was Prof. Dr. August Kerckhoff of Paris. He at once set to work with great diligence, and by the beginning of 1889 much had been done towards preparing a new grammar and vocabulary. But at the Paris congress of 1889 rifts already began to appear. Schleyer, the founder, who had been given the ornamental post of *Obervorstand,* would hear of no important changes; the director and the academicians quarrelled; the various Volapük societies and journals had begun to split up into factions; and a mass of grammatical projects, which the organization was incapable of sifting, poured in upon the Academy. The result was that interest and propaganda quickly died away. In 1891 Kerckhoff resigned, and in 1893 the election, by a provincial committee, of Woldemar Rosenberger of St. Petersburg as director, was confirmed. He proceeded to reform the vocabulary by restricting it as far as possible to words already international (for instance, instead of *blod* he proposed *frat*; Mr. Plum of Copenhagen, however, preferred *fratr*). Investigation showed that there are about 8000 word-stems common to English, French, German, Italian, Portuguese, Russian and Spanish, and accordingly it had by now become the practice for all artificial languages to select their word-stems as far as possible from the living languages and from Latin, preference being given to the stems common to most languages. The grammar also was re-modeled, and under Rosenberger's auspices the work of the Academy took a new lease of life. Meanwhile a number of other languages had sprung up, many of which influenced the deliberations of the Academy. Of these the principal were, according to Rosenberger,[2] the following:

[2] W. Rosenberger, *Wörterbuch der Neutralsprache,* Leipsic, 1902, p. 300.

1. "La lingvo internacia," Dr. Esperanto (Warsaw), 1887.
2. "Kosmos," Eugen A. Lauda (Berlin), 1888.
3. "Spelin," Prof. J. Bauer (Agram), 1888.
4. "Myrana," J. Stempfl (Oberreuth, Bavaria), 1889.
5. "Lingua internazional," J. Loth (Vienna), 1890.
6. "Universala," Dr. Eugen Heintzeler (Stuttgart), 1893.
7. "Novalitiin," Dr. E. Beermann (Nordhausen), 1895.

The list is interesting as showing that the age was as fertile in artificial languages as in patent foods, and indeed many of the names would fit the one product as felicitously as the other. The point to be noticed about the academic language thus evolved is that it differed essentially from previous artificial languages in being, not the creation of an individual, but the result of the labors of an international society. It preserved the Volapükistic principles of almost completely phonetic writing, of no exceptions to rules, and of simplicity and ease in forming derived words from the given radicals; and it was much easier to learn than Volapük, because most of its words were immediately intelligible to all educated Europeans and Americans. In 1898 the Rev. M. A. F. Holmes, of Macedon, N. Y., was elected director of the Academy, and "Idiom Neutral" was adopted as the name of the language.

Volapük was thus completely transformed. But the independent growth of a host of other languages, and particularly of Esperanto (as the language invented by Dr. Zamenhof of Warsaw had come to be called, from the pseudonym used by him) had produced a situation which became acute in the opening years of the present century. In the autumn of 1907 an international committee met in Paris, to choose the best system. Most of the members were people who at least coquetted with Esperanto; yet they could not deny its grave faults, and a com-

mission was accordingly appointed to draw up an improved Esperanto, which was subsequently called Ido. More than nine-tenths of the Esperantists refused to accept the reforms, and nearly all the adherents of other systems decided to work further on a scientific basis. The most prominent joined the original Universal Language Academy, which, under its present name of "Academia pro Interlingua" had been breaking new ground, not by concocting yet another artificial language, but by taking Latin and divesting it of its flexions and complicated grammar.[3] In 1911 the Academy consisted of more than 100 members in Europe, America, Asia and Oceania, including 18 university professors.

There thus exist to-day two main divergent tendencies, both the fruit of the movement that began with Volapük. On the one hand we have in Idiom Neutral, Esperanto and Ido, the attempt to create languages, each fulfilling more perfectly than the last the ideal of being completely rational and easily intelligible, in theoretical independence of any one natural language. Interlingua, on the other hand, while inspired by much the same ideals, seeks to attain them by a different method: it is not a purely artificial language, but tries to secure the same simplicity and intelligibility, and perhaps also the same thorough-going rationality as the artificial languages, by taking one natural language, Latin, and cutting away all its irrational elements, its complications and anomalies. Before we compare the merits of these two systems, it will be well to clear our ideas by shortly considering the principal conditions which a language must fulfil to be completely "rational." In doing this I shall refer only to Ido; for Esperanto, which was widely diffused until recently (especially in Russia, where it was enthusiastically welcomed by Tolstoy), appears now

[3] See two papers by Professor Peano: "De latino sine flexione," *Revue de Mathématiques*, Vol. VIII; "Il latino quale lingua ausiliare internazionale," *Atti della R. Accademia delle Science di Torino*, Vol. XXXIX, Jan. 3, 1904.

to be on the decline, and is generally admitted to be inferior to Ido, which, as is well known, enjoys the support of the eminent mathematician, logician and philosopher, Dr. Louis Couturat.

* * *

1. Perhaps the most important principle which an ideally rational language must observe is that which may be called the *principle of maximum analysis.* On a superficial view it looks as if English, when it takes six words, "those who are about to die," to express what in Latin only requires one, "*morituri,*" were a degraded jargon as compared with Latin. But in fact, though the extreme synthesis of Greek and Latin permits the most fascinating refinements of style, this tendency of modern languages to express each separate idea by a separate word is a great step forward in evolution, both as approximating speech to the ideal of a logical symbolism, and as enormously simplifying grammar. Leibniz already perceived this: "In grammatica rationali necessarii non sunt obliqui, nec aliae flexiones."[4] An artificial language, therefore, will carry to its utmost limits the process of getting rid of all flexions, such as the case-endings of substantives, adjectives and pronouns, and the personal, temporal and modal inflexions of verbs. Leibniz even suggested that a plural sign was unnecessary,[5] but this may be doubted, though some natural languages do sometimes dispense with it, e. g., German "*tausend Pfund.*" The truly rational language will be even more analytic than English, for English, though the best of the major European languages in this respect (perhaps agglutinative languages like Chinese are better still), is still far from perfect; for instance, we unnecessarily keep such oblique cases as "him," "them," "her," and such plural forms as "these," "those." Now it may be observed at

[4] Couturat, *Opuscules et fragments inédits de Leibniz,* Paris, 1903, p. 287.
[5] *Ibid.,* p. 281.

once that Ido falls short here. In its verbs, while abolishing the personal flexions, it keeps a full set of flexions for the three tenses of the indicative (*me kredas,* I believe; *me kredis,* I believed; *me kredos*, I shall believe), and also for the three corresponding infinitives and participles (present infinitive, *kredar*; past infinitive, *kredir*; future infinitive, *kredor*; present participle, *kredant*; past participle, *kredint*; future participle, *kredont*). Dr. Couturat regards this as a merit,[6] but I think that the logic of it, though symmetrical, is shortsighted. On the principle of maximum analysis we need no separate tense- or mood-forms for the future, nor, probably, for the past: all can be expressed by combining different auxiliaries with a single fixed verb-stem. A present participle active is probably necessary, but past and future participles active are certainly not. Similar remarks apply to the retention by Ido of inflexions for the imperative, conditional and subjunctive moods. In English the absence of a flexion for the imperative is not found troublesome: when necessary the symbol ! can be used to mark it.

The principle of maximum analysis abolishes that part of grammar concerned with the declension of verbs, regular and irregular, and substitutes fixed verb-stems and a few auxiliaries, by the combination of which all the required moods and tenses can be expressed. Also, for the synthetic method of expressing relations by means of case-endings (e. g., "Ich gab *ihm einen* Kuss") it substitutes the analytic method of prepositions, already carried far in English ("I gave a kiss to him"). Thus Dr. Couturat suggests[7] that even the accusative case might be expressed by a preposition, as, he might have added, is actually done in Spanish. But this remark, together with our last example, indicates an obvious limitation on the principle of maximum anlaysis

[6] "Sur la structure logique du langage," *Revue de Métaphysique et de Morale,* Jan. 1912, p. 15.

[7] *Ibid.*, p. 21.

—a limitation which may be formulated as the *principle of uniformity of position.*

2. If an unrestricted range be given to the principle of maximum analysis, we should always have one word for each separate concept. But this would be intolerably cumbrous in practice; the functions of speech are not the same as those of a logical symbolism, and we wish our language to have as much esthetic merit as is compatible with precision. Now cumbrousness can be avoided without loss of precision by invoking the *principle of uniformity of position.* That is to say, we shall have fixed rules (they will be few and simple) according to which the meaning of a sentence will depend partly on the relative positions of the words in it. All languages use this principle, some more than others, and it is not unknown to symbolic logic. In English, for instance, in "I gave him a kiss," we avoid *both* a special flexion for the dative case, *and* the expression of it by a preposition, by assigning to the pronoun a definite position in the sentence. It is obvious that this device, perhaps the most ingenious of all linguistic triumphs, makes the allocation of a preposition to the accusative case superfluous: that case can always be expressed by the mere fact of its coming after a transitive verb. No doubt ambiguities will sometimes occur (e. g., "I love him more than you"), but even a rational language may safely leave something to the context. But the importance of this principle, from the point of view of economy, lies in the generality of its application. When it is said that the meaning of a sentence depends on the relative position of the words in it, I include under "words" what are usually considered as parts of words—namely affixes, suffixes and particles. Thus, in English, such suffixes as -al, -ality, -ous, -ousness, -hood are really words standing for general concepts, which, combined in a certain position with other words, express concepts of less generality. An artificial

language will copy this feature of natural languages, but whereas the natural languages, owing to the accidents of growth, perform the process with infinite irregularity and caprice, it will do it systematically and uniformly. For instance, "what can be ...." will be expressed by one symbol added to verbs (Ido, *-ebla*: *manjebla* =eatable), and "what ought to be ...." by another (Ido, *-enda*: *punisenda* = what ought to be punished). In English the absence of some such symbol as the last has caused an ambiguity with serious consequences: "desirable" has to do service both for "what can be or is desired" and also for "what ought to be desired," whence J. S. Mill and others could plausibly identify what is desired with what is good. And in France it is conceivable that one might be hanged under a misapprehension, for no one knows whether *pendable* = "what can be hanged" or "what ought to be hanged." Other suffixes and affixes in Ido are *-eso* = "the fact of being so and so" (*beleso* = beauty, *avareso* = avarice); *-ozo* = "full of" (*kurajozo* = a brave man); *-ajo* = "ness" (*blankajo*, whiteness, *vakuajo* = a vacuum); *-iv* = "capacity for" (*resist-iv-eso* = capacity for resistance); *-em* = "tendency to" (*resist-em-ezo* = tendency to resist); *-atr* = "participating in the nature of" (*sponjatra* = sponge-like); *-al* = "relative to" (*religiala milito* = a war of religion, whereas *religioza milito* = a religious war); *ne-fidela* = faithless; *des-ordino* = disorder; *-ega* = augmentative (*grandega* = enormous); *-eskar* = inchoative (*dormeskar* = to fall asleep); and so on. These examples show how in an artificial language groups of cognate words can be formed on a regular system, thus avoiding the ambiguities that attend the formation of such compounds in the natural languages; and they also illustrate (a point to which I shall return) one of the ways in which a rational language must be most conspicuously artificial.

We may accordingly sum up the superiority, in point

of rationality, of an artificial language over any natural language, under the above two main heads. It is, or should be, more analytic, and more consistently so, than any actual language; its grammar should be capable of being written on a half-sheet of note-paper. And, by remembering the rules governing the relative positions of words and parts of words, it should be possible to detect with certainty the precise meaning of any sentence. These features make it easier than any foreign language to speak, write and understand accurately.

* * *

We are now in a position to answer the question, How does the semi-artificial Interlingua compare with a purely artificial rational language? I shall try to show that, while there is not much to choose between them as regards their observance of the principle of maximum analysis, Interlingua must, as long as it remains only semi-artificial, be inferior as regards observance of the second of the above principles. But it does not follow that it is either better or worse on the whole as a universal language. To decide that question we shall have to take into consideration other factors independent of our two principles: it may be an easier language for other reasons; and much depends on the purpose for which it is intended.

And, first, as to Interlingua's observance of the principle of maximum analysis. The Academy has not yet (October, 1912) decided on the flexions of verbs, but there are indications that it will not make as clean a sweep of them as is made even in English, and that thus it will not observe our first principle more closely than Ido does. It has been decided to adopt for the indicative of all verbs the Latin 2d person imperative singular; and the person-endings, singular and plural, are of course discarded, as in Ido. Thus "I love" = *me ama*, "you love" = *te ama*, and so on. But I observe in the journal *The International*

Language for August, 1912, (edited by Gerald A. Moore, London) that special forms are used for the conjunctive and infinitive moods: for instance, *esserè possibile adoptare* = "it would be possible to adopt"; and a prominent supporter, J. B. Pinth of Luxemburg, proposes other forms for the future, the present participle active, and the imperative.[8] On the other hand, Professor Peano told me in conversation that he used no flexion for the future, but expressed it by an auxiliary. In the case of substantives, adjectives and pronouns, the Latin ablative singular is used for all cases, the plural being indicated by the suffix *-s*. However, one of the great merits of Interlingua is its elasticity; every one can be left, within wide limits, to use as few or as many flexions and other grammatical forms as he pleases, without being any less readily understood by any one who has learned Latin; and we may therefore hope that the Academy will refrain from officially fixing a set of verb-flexions which, besides violating logical purity, would be of no practical use.

Secondly, as regards the principle of uniformity of position, I am not aware that the Academy has considered any proposals for determining the meaning of a word by its position in the sentence, or for the regular derivation of cognate words from one another by means of suffixes and affixes. Indeed it seems that in this last respect Interlingua must from its nature be inferior to a purely artificial language. Take, for instance, such a group of English words as elect, elector, election, elective, electioneer, electioneering. A purely artificial language will represent all the members of the group by suffixes arranged on some logical principle of derivation, but Interlingua cannot do this without abandoning its Latin character to such an extent as to be practically indistinguishable from Ido or Neutral. For one of

[8] J. B. Pinth, *Die internationale Hilfssprache Interlingua*, Luxemburg, 1911, p. 6.

the chief ways in which modern European languages have developed and are developing every day, is by forming new words, as new meanings are required, by piling up suffixes on the top of old words (for instance: utility, utilitarian, utilitarianism; intellect, intellectual, intellectualism, intellectuality), and the number of new words created by this process is so great that Interlingua is in a dilemma. Either it must form such compounds for itself, only on a logical plan, and not haphazard like the natural languages; or it must get round them by periphrases. In the latter case it will be as inapt for the expression of living thought as classical or medieval Latin; in the former, its vocabulary will be nearly as much inflated with purely artificial products as Ido or Neutral, and it will lose the specific element of Latinity which distinguishes it from such languages. For, if it does adopt some rational system of deriving cognate words from one another, it is hard to see in what way it will differ from, for instance, Ido. It will not differ greatly in vocabulary. The first two resolutions passed by the Academy in 1910 are (1) That Interlingua shall have a vocabulary as international as possible, and as little grammar as possible, and (2) That all words common to English, German, French, Spanish, Italian, Portuguese and Russian shall be adopted. Now all the purely artificial languages that are up-to-date aim at having a vocabulary as international as possible; and we have seen that the grammar of Interlingua is little, if at all, simpler than theirs. Nor does the third resolution of the Academy—That all Anglo-Latin words (some 55,000) be adopted—differentiate it: the best artificial languages also adopt these words, with the result in practice that both they and Interlingua are dialects of Neo-Latin. We shall therefore await with interest the carrying out of the Academy's fifth resolution: That a vocabulary of the words not defined by the above resolutions be prepared; for the nature and bulk

of this supplementary vocabulary should be decisive of the future character of the language. If a layman may express a hope, it is that the above-mentioned dilemma will be escaped by leaving each Interlinguist to form his compound words for himself, *not* on any logical plan, but haphazard, as seems most convenient. It is true that in that case Interlingua must, *pro tanto*, renounce the hope of being completely rational, and consequently of being universal in one of the senses in which the artificial languages aim at universality; but I shall argue presently that this is not a disadvantage.

Meanwhile two minor points of interest may be noted. The Academy has decided to adopt the usual nomenclature, already to a great extent internationally standardized, in botany, zoology, chemistry, etc. This, as enabling it, for instance, to preserve the universally recognized symbol Cl. for chlorine, gives it a distinct superiority over Ido, which calls chlorine *kloro*.

The Academy has resolved that the articles, when useless, ought to be suppressed. Probably they are more often useful than not, though there are no articles in the Slavonic languages. Many Interlinguists use *il* (contracted from *ille*) to represent the notion, so important logically, which is denoted in English by "the."

* * *

The advocates of Interlingua claim that it is superior to any of the purely artificial languages, because (1) it is more analytic, and (2) it deforms the international vocabulary less excessively. But we have seen that, as at present written, it does not seem to be markedly more analytic than Ido; and that, if it refrains from deforming the international vocabulary, it must be at the cost of being less completely logical than an artificial language. At the same time, its superiority to the purely artificial languages must, I think, be admitted; but this superiority depends (and its

supporters do not seem to notice this) on its not trying to be a *universal* language in any broader sense of the word. That is to say, it is certainly more readily intelligible and more easily managed by any one who knows a little Latin than any of the purely artificial languages, and this fact makes it better fitted than any of them to serve as a medium of communication between men of learning and science of different nationalities. Any one who knows a little Latin can at once understand the following. "Volapük es mortuo ab Esperanto, isto es in periculo per Ido; quale solutione es possibile post 'latino internationale'? Nullo alio; nam isto plus non contine uno elemento arbitrario, et habe simplicitate in grammatica superiore multo ad Volapük, et ad omni derivato."[9] But it does not seem to be generally realized that it can retain this advantage, which makes it a handier substitute for the scientific dog-Latin (such as Euler's) of the 17th and 18th centuries, only so long as its ambition is restricted to being universal in this narrower sense of being a *lingua franca* for savants. For there are two other principal senses in which a language may be called universal, and it seems (unfortunately, as I think) that Interlingua is intended to be universal in these senses as well.

A language may aim at being universal in the sense of Leibnitz's "universal characteristic." Professor Peano, though he goes on to notice the essential difference between a language and a system of logical notation, seems to have this aim in mind when he describes as follows the process by which he produced his "Latin without flexions": "The study initiated by me is based on a series of logical equivalences, containing in one member one word or one flexion, which is not contained in the second member. Hence, if we substitute constantly the second member for the first,

[9] Proceedings of the *Academia pro Interlingua*, Vol. III, 1912, p. 155, Turin.

we can remove from Latin that word or that flexion. Proceeding thus, we shall arrive at determining what is the minimum number of words, affixes and suffixes, sufficient to express all ideas, and we shall thus construct the *minimum Latin*. This method is an application of mathematical logic, which, by a succession of equivalences, permits the decomposition of a totality of mathematical ideas into primitive and derived ideas."[10] I have pointed out that this task is performed by the purely artificial languages also, and more completely by them than by Interlingua, and that, if Interlingua emulates them in point of complete rationality, it is bound to deform the international vocabulary as much as they, and thus to become equally difficult, even to people who know a little Latin.

Now evidently a language might be perfect as a "universal characteristic," and yet be used by only a few people. Interlinguists, however, often speak as if they intended their language not only to be as completely rational as possible, nor to be merely an auxiliary language for the learned, but also to aim, as do the purely artificial languages, at being universal in the further sense of being used by every one who comes into contact with people of other speech than himself; they wish it to serve as an international medium for commerce, travel and the publication of works of literary art. Thus the veteran *Weltsprachler*, Josef Bernhaupt, in a message addressed to the Academy, writes (sinning unnecessarily against the principle of maximum analysis), "Artista, advocato, filosofo, medico, oratore, poeta, professore, sculptore, etc., debe potere exprimere seos cogitationes et seos sentimentos cum maxima precisione et sine ulla difficultate. Si Interlingua non habe ista qualitate, illa vale nihil et non poterà essere, et non sarà in ullo tempore, lingua de tota humanite."[11] It seems

[10] Peano, "Il latino quale lingua ausiliare internazionale," *Atti della R. Accademia delle Scienze di Torino*, Vol. XXXIX, Jan. 3, 1904, p. 9.

[11] Proceedings of the *Academia pro Interlingua*, Vol. III, 1912, p. 146.

to me that this inclusion of all mankind, the grand object of all makers of universal languages, is chimerical; that it is not possible of attainment, even if it is desirable; and that its advocates tend greatly to exaggerate the benefits that would flow from it, were it attained. I may perhaps be allowed, in conclusion, to say something on these points, in order to justify my hope that Interlingua will not, by aiming too high, throw away the opportunity which it has of doing service to mankind.

* * *

The reason for thinking it impossible to establish an artificial language which shall be universal in this wider sense is drawn from experience, and is therefore not conclusive; it does, however, raise a strong presumption, since the history of such languages since 1880 seems to show that a general cause is at work to produce their rapid rise and equally rapid decay. The idea, once launched by enthusiasts eager to promote the spread of knowledge, the fraternity of mankind and "the federation of the world," is taken up by large numbers of the moderately leisured classes, and the construction of an idiom free from the absurdities of a natural language goes on apace. But presently inconsistent projects, whether in grammar or vocabulary, engender hostile sects, the organization breaks down, enthusiasm languishes, and the ground is left clear for some new construction, which in its turn will suffer the same fate. It seems, in short, inevitable that different sections of the public should prefer different words and different grammatical forms. No central committee is likely to be strong enough to reconcile the dissentients; if it is tactful (and committees tend to be tactful) it will enact a compromise disgusting to all alike. It may be argued that Interlingua, not being a purely artificial language, is exempt from this doom. I have tried to show that if it claims at universality in the same sense as the

artificial languages, as there is danger of its doing, it must become as artificial as they, and it is a fair inference that in that event its history will proceed on the same lines.

But, even if we suppose the practicability of a universal language in this wider sense, is it after all a thing so greatly to be desired? It is usual to speak as if it were not only highly desirable but a necessity. The modern growth, it is said, of international intercourse, caused by steam and electricity, has been accompanied by no corresponding increase in the ease with which men can communicate their ideas; a universally intelligible medium is now as necessary as the telephone or telegraph; and such a medium, by in turn reacting favorably on international trade and communication generally, would advance the cause of universal peace. Another argument is that increased international intercourse makes it more necessary than formerly for large numbers of people to learn several foreign languages, and that, all of them being illogical and complicated, this involves a strain on mental energy and an overweighting of the curricula of schools, which would be saved by the acceptance of one single universal idiom.

I do not want to deny that there is something in these arguments, though perhaps, if space allowed, it might be shown that there is not as much in them as is usually thought. What I want to point out is that, if we accept them as conclusive, a consequence follows which the advocates of a universal language always seem to disregard, —namely that we must give up something which is undoubtedly of great value. That many people are forced by their vocation to learn one or more foreign languages, which *ex hypothesi* they would not learn if there were a universal language, is certainly a great good, since in this way a certain measure of insight into one another's mental life and traditions, and some appreciation of one another's literatures, are fairly widely diffused among all polite com-

munities. These collateral advantages accrue, for instance, to every scholar and man of science and to every trader who learns a foreign language because it is necessary for his particular study or trade, and in proportion as the *Weltsprachler* attain their ideal these advantages must be lost. The question we ought to ask ourselves is, whether we can be sure that the benefits caused by a universal language, supposing it established, would outweigh or even be equal in value to what must be lost in the process.

It is too often forgotten that in this world many things desirable for their own sakes are in fact incompatible with one another, and whoever considers what sort of things *are* thus desirable, must feel that the answer to our question is at least very doubtful. Now acquaintance with a foreign language is, quite apart from its usefulness, one of those objects that are desirable for their own sakes; for one thing, all natural languages (even German) have peculiar beauties of their own, whereas few will maintain that an artificial language, however rational, is capable of the same kind of beauty as the rude natural growth. It may indeed be said that a rational language has that sort of esthetic merit that comes from perfect logical precision,—that it is impossible, for instance, to make a pun in it. To this it may be replied that people have the language they deserve: if their ideas are logical, their language will serve their turn well enough, and no study of a rational language can be a short cut to clear thinking.

To sum up. The value of universal acquaintance with an artificial language seems to consist almost solely in the fact that it would be a means to other valuable things, such as increased international intercourse. But a large part of the intrinsic value of these very things consists in something which the artificial language, if it is to be effective as a means, must destroy,—namely the knowledge of foreign languages which large numbers of people are at pres-

ent forced to acquire. And it is impossible to feel sure that among the effects produced by a universal language would be any whose value would make up for the loss of this knowledge.

This argument, however, does not apply to Interlingua, provided it accepts the more modest rôle, for which it is admirably fitted, of a medium in which scientific works may be published and correspondence be carried on between the learned. The usefulness of such a medium is obvious. If there are any writers so hard-pressed that they must forego the advantages incidental to learning to read three or four foreign languages, they would still be able to keep up with the work of their foreign colleagues; the expense and labor of translations would be saved; and the profits of authors and publishers would be increased, because an international public would make large editions possible, and the cost of production would be proportionately diminished. Such are some of the benefits that may be expected, if a simple form of neo-Latin, easily intelligible to educated people, can be brought into general use; but they seem likely to be lost, if, sacrificing the substance to the shadow, the Academy tries to rival the universality of the purely artificial systems.

SYDNEY WATERLOW.

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THE AGNOSTIC.

I.

With all my being I desire to know,
Nor shall imagination's tempting glow
Lure me from reason's firm and upward road
To plunge into that vapor-haunted wood,
Where thought is lulled to sleep by heart's desire,
And fungus-lights of faith replace the fire
Of truth's lone beacon shining far on high,
In pure untainted air of reason's sky.
For ages I have struggled toward that light.
From age to age its radiance grows more bright.
A thousand centuries but mark the youth
Of thought that ever seeks eternal truth.
Far, far beyond me gleams the beacon true,
Now near and clear, now almost lost to view
When self-born tempests raise a misty cloud
To veil the eye of reason with its shroud.
Some vantage-points I've gained through centuries slow,
Some truth is mine, the most is yet to know.

II.

What know I of the dawn of life sublime,
That point infinitesimal of time,
That makes the unborn babe a separate "I"?
One instant but a growth, wherein doth lie

A balanced potency, to live or die,
The instant next an entity, a whole,
Beyond the mother's knowledge or control!
What unknown power has weighted down the scale
Of life, to make its potence of avail?
Imaginative creeds perchance may say
That in that moment ripe some soul astray
Or else predestined, enters here to stay.
I too may dream of things that might be so,
But reason says, "The cause not yet we know."

III.

Is death the end of this intrinsic I?
This conscious self that still demands the why
Of all things, and insists upon reply?
Shall individual consciousness be lost
When worn or broken body pays its cost?
When the machine fails shall the motive power
Be also lost?—Is life then but a dower
Of universal force, transmuted to this form,
Evolving in the ages from the worm
Through better mechanism, to man's estate,
Where for the moment it must culminate?
Shall individual life be merged, at death,
In that great unit force that gave it breath?
Materialism says "This must be so!"
Agnosticism, "This not yet we know."

IV.

The consciousness of individual soul
Is so deep-rooted that it must control
The thought that aims to scale these dizzy heights:
Reason may not surrender all its rights
To immortality. It cannot see

What lies beyond the mortal boundary.
It cannot know the things not of its sphere:
No word of "after-death" can reach its ear;
For if a spiritual life exist
It is not human, and cannot persist
In human functions when its mortal frame,
The outward form that gave it human name,
Is absolutely changed by nature's law,
Disintegrated and returned to feed the maw
Of newer life that lives upon the old
And still springs upward from the chemic mold
To follow nature's never-varying round
Of life destroyed, that life may more abound.
The spirit, if it live, has lost its kin
With kindred spirit still immured within
A fleshly tabernacle. No appeal
Can be received by mind still under seal
Of brain capacity that cannot hear
Aught but what speaks through human reason's ear.
Therefore, perhaps, no evidence has come
From that unknown that lies beyond the tomb;
No voice authentic from the dark abyss
To which each soul must plunge at death's cold kiss.
There can be no report for "Yea" or "Nay,"
No evidence that pointeth either way.
I claim no faith, but while for truth I grope
'Tis not unphilosophical to hope.

v.

What of the God that reason's mighty aid
Imagination, has each age portrayed
In man's own image, to make good the call
Of reason, for a primal cause of all?
In man's own image, so that self-bound man
Worships himself, with but a larger span!

"God is the greater I, my self-made rod
Projected infinitely, measures God."

The law-bound reason, circling for a cause,
Confronts itself and its own changeless laws.
Nothing can be self-caused, yet time and space
Must be eternal, as the reason's base.
Therefore the higher pantheism taught
That time and space are God, through whom is wrought
The universe, and that the natural world
Is but God's effluence to man unfurled;
That man himself, the individual I,
Is but a reflex of God's entity.
My reason finds some fallacy in this,
The juggled words of false philosophies.
It sees imagination's hand disguised
By glove of sophistry, half recognized.
It lingers o'er that hand that seems to hold
The answer to its questions manifold.
But deeper thought provokes the judgment slow.
"This may be truth, but this not yet we know."

VI.

What is "the faith"? Saint Paul, the subtle Greek
Has made an answer, but in vain we seek
For any meaning in that wily phrase
Which to the ear of reason still conveys
The "tinkling brass and sounding cymbal" noise
Of words that aim to baffle reason's poise.
The words are hallowed by the centuries
Of faith that leans upon authorities;
The same old faith that heard the *Latin* voice
Of medieval monk or priest, and did rejoice
In that supremacy of sounding word
That spoke of supernatural to the herd,

Who, like the silly sheep obey, and hark
To crook that promises or dogs that bark.

The man agnostic cannot quite disown
The heritage of faith that was his own.
Born in him, parted from, perhaps with pain,
But never to be of himself again.
It lingers from the youthful memory still
In those strange dreams that override the will.
I too have felt the spell of Paul's strange word
Upon the heart, when outer ear has heard
The deep-voiced organ's diapason note
Make tremulous the air, and when the throat
Is closed by feeling's tide that rises high,
And for the moment clouds the reason's eye.

So, much religious faith has had its birth
In the emotion, and is only worth
Emotion's value, not to be disdained,
But to be tested, and to be restrained
When reason asks, "How know I this is so?",
And hears the futile phrase, "Believe, and thou shalt
know."

Religious faith can claim a parentage
Of crude imagination, in each age
Fostered by ignorant zeal or crafty skill
To stifle reason, and to make the will
Of man bend pliant to a mighty power,
Dreaded because unknown, as in the hour
Of half-awakened sleep we seem to see
The known, as unknown, and may even be
Half frightened by the spectral shape that leaps
From out the dream that grows while reason sleeps.
So faith has built her insubstantial homes;

While reason sleeps she rears her airy domes,
Founded sometimes upon the heart's desire,
Sometimes the fear of an eternal fire.
When reason wakes they totter to their fall,
But baseless vision fabrics, one and all.

The past is strewn with ruins of her fanes,
Often, like ancient towns, built on remains
Of older faiths, so that the mind can trace
Religion's evolution in the race.

One faith is mine, the faith in law supreme,
The continuity of nature; if it seem
That things called "supernatural" arise
They know a law still veiled from human eyes.
As yet we see but darkly, but we know
That law must still control the ebb and flow
Of all things, as it does the ocean tides;
Changeless, eternal law that still abides.
That that which is, has been, and still shall be
The same, to uttermost eternity.
This is the scientific faith, based on the truth
Of all that man has learned since reason's youth.

VII.

Is life worth living without after-life?
Is self-thought all that holds us to the strife?
Does love of wife or child give less delight
Because we fear to lose them in the night
Of unknown death?—Nay, rather "while we live
Take all the joys that death and life can give."
Not in the Roman singer's careless strain,
Nor even subtle Omar's deeper vein,
But in the higher thought that life is ours

To live completely, to use all the powers
Within us to make life of some avail
To self and others, if at last we fail
To carry self beyond the body's death
We still remain immortal in the breath
Of every word and act of ours on earth,
Whether or no we recognize their worth.
No shadow falls upon a human heart
But leaves eternal imprint of its part
In lessening life's essence for the race;
No ray of truth in thought but finds its place
In piercing some dark nest of ignorance foul,
And breeding truth within a human soul.
Not one, but many shadows make the night;
What myriad rays are needed for the light!

VIII.

Truth, like the universal force, is one.
Not for the keen-eyed intellect alone;
But for the feeling, and the moral sense
The steadfast duty, scorning consequence.
The right is truth, and beauty which appeals
To feeling, with its magic spell reveals
The way of truth, as when the sudden glow
Of summer lightning makes us swiftly know
The path we sought for in the murky night
With careful footing to the left and right.
Emotion and imagination play
The lightning's part along the mental way,
But when the flash is gone sure reason's tread
Must test the ground to which their light has led.
Too often 'tis a by-path where we stray
Far from the truth's direct and upward way.

IX.

Because we fear not hell nor dream of heaven
Shall we pollute our souls with poisonous leaven
Of luscious vice, that grows from sire to son,
Retarding that evolving work begun
When life—whate'er it be—took fleshly shape?
Shall we degenerate to loathsome ape?
Whole families of man have met this doom,
And have been blotted out, to make more room
For those whom nature's law selects as best
To carry on that marvelous bequest
That man shall slowly rise to higher power
Of brain and heart. We cannot know what dower
Of wisdom vast a future race may claim;
We can be builders, with the lofty aim
Of aiding, not retarding, nature's plan,
Strangely foreseen in mythic devil's scan,
When "Ye shall be as gods," he said to man.

X.

There is a beauty in the Christian's death.
In sweet serenity of childlike faith
He falls asleep upon a father's arm,
With simple trust believing that no harm
Can reach him through the strange dark hours of night,
And that the Father's hand can make the light
Spring up from some new sun of life, to shine
In undiscovered realms of bliss divine.

But is this nobler than the death of man,
Religion's orphan, who can only scan
The past and present, but who cannot see
Through the black veil that hides futurity?

No faith nor father offers promise sweet
Of life to come and recompense complete.
He only knows that law shall still prevail,
Nor plea nor pretext anywise avail.
Equal to either fortune, he awaits
The knowledge—or the silence—of death's gates.
He parts from life, the law of life obeyed,
Unknowing, unbelieving,—unafraid.

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CRITICISMS AND DISCUSSIONS.

REFLECTIONS ON IMMORTALITY.

CHAPTER XI OF HAECKEL'S "THE RIDDLE OF THE UNIVERSE."

"If a man die, shall he live again?" Job, xiv, 14.

A summer night; an open casement, and near by a candle brightly burning, in whose rays a student ponders over volumes of ancient lore.

"I am so beautiful," says the candle-flame; "I drive away the thick gloom and give light and joy to this lone student in his profound studies. Surely I must live forevermore! What rapture, when freed from this gross candlestick, to soar through the realms of space—transformed, immortal!"

Suddenly, through the casement, came a breath of that summer night, and the bright flame was outblown: student, apartment—all wrapped in darkness!

But hark! what weird music on the rising breeze? Ah, the harp, erstwhile silent, has awakened to Æolian strains, and the night is beautiful with melody; while the swelling blast arouses ever louder, wilder and more exultant minstrelsy:

> "Harp of the zephyr, whose least wave o'er
> Thy tender strings stealing, is felt by thee—
> Harp of the whirlwind, whose fearfullest roar
> Can arouse thee to naught but harmony."

"Oh," exclaims the wind-harp's voice," my music, so fitted to move, to thrill and exalt the soul, can never die. When freed from these clogs of wood and iron I shall fly away, forever rejoicing in aspiring song!"

Meantime increased the gale in strength and fury; when, crash! fell casement-walls, crushing harp and harpstrings, and their triumphant notes—where are they?

And now night and storm have passed. The sun, rising into the cloudless blue, lights up a wide landscape, sloping from mountainside, in hills, and vales, and woodlands, and silvery streams—away to the sea, far-gleaming on the horizon's verge; a landscape all glittering with jewels resting motionless on grassblade and petal, or pendant from leaf and plumy tree-top.

Such calm! Such glory of morn, of earth and sky! Stooping to examine minutely a dewdrop, one of the countless millions around me, I hear it say: "Behold, skeptic and materialist, this graceful form! a sphere of light—clear, undimmed by aught of soil or stain, reflecting the infinite heavens, imaging yonder sun—think you that such wondrous and illimitable powers were conferred only for an hour, a day, or a year? Ah, no; these gifts cannot die. I shall live forevermore!"

But soon the sun has risen midway up the eastern sky; a whiff of air has stirred herbage and foliage; the myriads of dewdrops—tiny ambitious children of the swift tempest—where, O, where are they? Exhaled in the fervid sunbeams, shaken upon the ground, mingled with rivulet and river—and they hastening to mingle with that far-gleaming sea!

C. W. KENDALL.

MT. RAINIER, MARYLAND.

THE PROBLEM OF LIFE AFTER DEATH.

WITH REFERENCE TO MR. C. W. KENDALL'S "REFLECTIONS ON IMMORTALITY."

If a light shines in the night and is blown out, shall it ever be lit again or shall it remain extinguished forever? Most assuredly it may be lit again, and certainly it will be if ever it be needed. But the question arises, Would a light lit in the second watch of the night be the same as the light that burned during the first watch? Such was the question which the Buddhist ságe Nagasena proposed about 2000 years ago to the Greek King Meleander, called by the Indian people Milindo, as recorded in the Buddhist book, *Milindapañyo*. And the answer was that in a certain sense the light of the second watch is, and in another sense it is not, the same light. It is the same in kind but it is different, as it burns at another hour and is feeding on other material though of the same kind.

The question is asked for the sake of solving the vexed problem

of personality and its continuance beyond death. The Brahmans of those days believed in transmigration of soul, the Buddhists did not. The Buddha had taught his disciples that there is no soul entity which can migrate, for every human being, as everything else, is a compound, is the result of a combination, and it lies in the nature of things that all compounds will be dissolved again. But while there is no transmigration there is rebirth.

That a deed (called *karma*) lives on and has an after-effect was scarcely doubted in India by any one and certainly not by the Buddhists to whom every individual creature was but the effect of former happenings. This is true of every organism, of man, of beasts and of plants, yea of chemical formations as well. Says Professor Huxley in comment on the Buddhist doctrine of karma:

"Everyday experience familiarizes us with the facts which are grouped under the name of heredity. Every one of us bears upon him obvious marks of his parentage, perhaps of remoter relationships. More particularly, the sum of tendencies to act in a certain way, which we call 'character,' is often to be traced through a long series of progenitors and collaterals. So we may justly say that this 'character'—this moral and intellectual essence of a man— does veritably pass over from one fleshly tabernacle to another and does really transmigrate from generation to generation. In the new-born infant, the character of the stock lies latent and the Ego is little more than a bundle of potentialities. But, very early, these become actualities; from childhood to age they manifest themselves in dulness or brightness, weakness or strength, viciousness or uprightness; and with each feature modified by confluence with another character, if by nothing else, the character passes on to its incarnation in new bodies.

"The Indian philosophers called character, as thus defined, 'karma.' It is this karma which passed from life to life and linked them in the chain of transmigrations; and they held that it is modified in each life not merely by confluence of parentage, but by its own acts.

"In the theory of evolution, the tendency of germ to develop according to a certain specific type, e. g., of the kidney-bean seed to grow into a plant having all the characters of *Phaleolus vulgaris* is its 'karma.' It is the 'last inheritor and the last result' of all the conditions that have affected a line of ancestry which goes back for many millions of years to the time when life first appeared on the earth.... The snowdrop is a snowdrop and not an oak, and just

that kind of a snowdrop, because it is the outcome of the karma of an endless series of past existences."

There is a transference of karma and this is accomplished according to natural law. The Buddhist sage is very careful to point out that there is nothing that migrates from a banana rotting in the ground to the new banana growing on the tree sprung from it, but there is a continuous concatenation of effects resulting finally in the rebirth of a new banana. This new banana is the same in kind as the old banana; it is the same in character, and it is by a continuous development the continued life of the old banana. A seed of the old banana has sprouted, has assimilated the surrounding soil and water to its own structure and in the course of its further growth reproduces itself. This is called by the Buddhists rebirth, and they insist that there is no soul entity, no self, no banana thing-in-itself, that passes over from the old banana to the new banana; but there is according to the karma of everything a re-formation of its character, and thus do deeds continue.

This is the basis of the Buddhist idea of justice. Everything good or evil persists and we reap what we sow. The new generation is in a certain sense not the same as the old generation, but in another sense it is the same; it is its continuation and its outgrowth, as much as, but no more than, the grown man is the same as the boy or even as the babe which he was born.

This theory of rebirth is not limited to the physical growth of a man; it extends also to intellectual fields as the same Buddhist philosopher explains. Thus thoughts, as transferred and thereby characteristic traits, intentions, aspirations, sentiments, knowledge, etc., are impressed upon others. Nagasena says: If the teacher recites a stanza and the disciple repeats it, cons it and learns it by heart, there is no particle of any substance, no entity of any kind, no self of the stanza transferred, there is no transmigration taking place, and yet the stanza of the teacher is impressed upon the mind of the disciple, just as a seal is impressed upon the wax, and thus by karma, by the form of activity, the stanza is reborn.

This ancient view of immortality is practically the truth of evolution. We ought not to call it in a negative form immortality, but in a positive description of what actually takes place, continuance of life and indeed a continuance of our most personal forms of life.

The Buddhist philosopher is very explicit in explaining the efficiency of karma. In connection with the allegory of the light he says: Suppose a man arises in the night and causes a lamp to be

lighted; if he dictates a letter and has his scribe take it down, will not the act of writing cease, while the written letter remains? This is to explain the truth about transiency and permanence. The doing of a deed passes, but the effect remains. When the letter is received by the addressee, he reads it and the writer's words are reborn in the addressee's mind. These are simple and very obvious truths, and they are the basis for all our moral aspirations. Our interest in life does not cease at death; our hopes and fears extend beyond the grave and our aspirations continue to live when our bodies meet with decay. And what are we? Are we our bodies or our aspirations? Are we matter or mind?

All religions possess the idea of immortality. They extend to man an expectation or a hope that he will live on in one shape or another, that what he has done will continue to have its effects and has not been done in vain; that his life is not as if it had been writ in water but leaves traces and helps to build up the future, and this hope is not vain. The allegories and notions of the nature of immortality are often gross and erroneous, yea superstitious, but the nucleus of the belief is true and for that reason it will never die.

Professor Haeckel is not thorough-going in the exposition of his monism. He is too negative. He is too much bent on telling people what is wrong in their religious beliefs to see the truth of the old doctrines. He has been carried away in the heat of battle to attack the windmills of superstition and forgets therewith to point out the positive truths of science, of monism, of the actual facts and the lessons implied in facts.

The conception of monism here propounded has been under the suspicion of being a kind of dualism, or at least a compromise with dualism; but it is truly monistic. In fact it is more monistic than the so-called Haeckelian monism, for it explains more and recognizes the significance of human life with its ideals and aspirations. The religious development of mankind is not a mere vagary; it is as much a natural phenomenon as the growth of a tree or the development of human society and all human institutions. From the start of his humanity man has been groping after certain truths to satisfy the cravings of his heart and bring him in tune with the All of life, the cosmos, the constitution of the universe. Our souls are not material things, or substance, or entities. Our souls consist of our wills, our thoughts, our sentiments, and these non-material factors, though not concrete objects, are as important in life, if not

more important, than the materials of which objective reality consists.

To present a true monism which would not overlook the most significant phenomena of existence has been the aim of our life's work, and we feel confident that we have succeeded. We challenge both parties, the old religionists and the new anti-religionists, to point out a flaw in our arguments. This world is a unitary system, its so-called laws of nature are only so many applications of the cosmic order, and the lawdom of the world (its *Gesetzmässigkeit*) implies that science is possible, that all phenomena are at least in theory comprehensible and that all of them can be harmonized in a world-conception free from contradiction—i. e., the ideal of our search for truth in monism.

P. C.

BUDDHIST INFLUENCE ON CHRISTIANITY.

The original German of Carl Clemen's *Primitive Christianity and Its Non-Jewish Sources*[1] appeared at Giessen in 1909, and the present English version is said to be brought down to date. The field covered is so wide that the performance is naturally unequal. While fully appreciating the author's conscientious toil, one could wish that he had sometimes consulted a specialist, particularly as regards Buddhism. His Buddhist criticism is thirty years behind the times. On page 36 he quotes in Kern's translation the famous Asokan Edict which draws up a list of scriptural selections sanctioned by the Emperor. But, worse than this: he also gives us Kern and Weber's attempts to identify the texts. Any Indianist could have told him that Senart, Bühler and Rhys Davids had advanced the interpretation since the time of Seydel and Kern. In Vincent Smith's *Asoka* (Oxford, 1901; 2d ed., 1909) these results are summarized. The first of Asoka's selections was identified in 1904 by an American scholar in *The Light of Dharma* (San Francisco), now reprinted in the *Journal of the Royal Asiatic Society*, April, 1913. As these titles are of fundamental importance for the antiquity of the Buddhist Scriptures and their power to influence the Christian, the use of a thirty-year-old translation is a grave defect.

Indeed the whole Buddhist-Christian problem suffers under Clemen's hands from inadequate treatment. The principal work on

[1] Edinburgh, T. &. T. Clark, 1912.

this subject is no longer one in German, but in English, and Professor Clemen confesses (page 8) that he has never even seen it. He knows it only by a 34-page abstract of 1904. Again and again does he quote the comparisons made by Seydel in 1882, without the aid of the Pāli Canon in its entirety, and ignores the detailed work which has since been done. Not only so, but Clemen fails to grasp the fact that, at the time of Christ, India was one of the four great powers of the earth, and that her most popular religion, Buddhism, was being propagated by missionaries in foreign countries, and its scriptures translated into the vernaculars of the Parthian Empire, the buffer state between Palestine and India. The Parthians who were present at Pentecost could have seen Buddhist texts in Sogdian and Tokharish. India was a maritime power with colonies on islands and continents, and her religious ideas were spread and discussed by merchants and travelers, just as they are to-day. The venerable Benjamin Smith Lyman, who has lived in India and Japan, assures me that this class of men discuss religion, and we know from Josephus that they did so at the beginning of the Christian era.

On page 317 Clemen is again thirty years out of date, in dealing with the Temptations. He quotes Seydel and Van Eysinga, neither of whom had access to the originals, but only to the small fraction of translated texts. It is true that Van Eysinga dates from 1901, but Seydel was confessedly his master, and he made no use of translations which were at that time appearing in Chicago.[2] Even in the second German edition of Clemen's book (1909), these are insufficiently used. Moreover, Clemen quotes the Lalita Vistara where he ought to quote the Classified Collection. So long ago as 1902 I printed the title: "Temptations of Empire and Power to Transmute Matter"; giving the reference to the Classified Collection and even to the German translations of Oldenberg and Windisch. In 1905 the whole comparison was printed at Tokyo; and in *The Monist* for January, 1912 (Clemen dates his new preface: Bonn, September 1, 1912) it was shown that not only these two Temptations had their root-ideas in Buddhism, but also the third: viz., the temptation to commit suicide. The difficulty is that Indianists are not New Testament scholars, and these latter are not Indianists. Only one man on earth is both: viz., J. Estlin Carpenter, principal of Manchester College, Oxford. Consequently a scholar who has spent his life and sacrificed his all in these researches can be ignored by even so careful and conscientious a worker as Clemen, whose footnotes are

[2] *The Open Court*, in scattered numbers of the years 1898-1903.

a forest of international names, and who is manifestly striving his best to do justice to all.

Doubtless his valuable work is much sounder in the more beaten tracks of Mazdaism and Chaldeism, though I observe that the crucial proof of Satan's derivation from Ahriman is overlooked. The fact is that, whereas in the pre-exilic Samuel, Jehovah tempts David to number Israel, in the post-exilic Chronicles it is Satan who does this. (2 Sam. xxiv. 1 and 1 Chron. xxi. 1.) This means that during the Captivity and the Persian period the subject Hebrews were very naturally influenced by their tolerant overlords, and that a former function of Jehovah was now exercised by the Devil, who had been brought among them by their political masters.

On page 359 Clemen says: "There are no grounds for supposing that Anando was (as Edmunds thinks possible) the original of the beloved disciple." This remark refers to the following from my *Buddhist Texts in John* (1906, p. 22): "I am sometimes tempted to regard the Beloved Disciple (so conspicuously absent in the Synoptists) as a Christian imitation of Buddha's Anando. Indeed it is remarkable that both these beloveds were assured by the Masters of attaining heaven here." (Texts quoted.) The grounds, which Clemen denies, are very strong. Here we have Mark and the Logia-Source with no Beloved Disciple and no Penitent Thief, whereas the later Gospels of Luke and John supply us with both. And why? Because the new religion had to compete with one already five centuries old and full of aggressive missionary activity, translating its texts and carving the scenes of its scriptures on temple gates. In India and Ceylon these sculptures could be seen, as well as in the realm of the Bactrian Greek traders who did business with Ephesus and Antioch. The Penitent Brigand was a favorite theme in these sculpures, and so was the Beloved Disciple.

These remarks are made in order that our learned author may improve his next edition by doing full justice to one of the greatest of ancient religions which demonstrably influenced our own. The discussion between Richard Garbe of Tübingen and two American scholars in *The Monist* for 1912 has reopened the whole question; and Clemen's work, which is already quite a mine of information, will be of greater service to the student when brought down to date.

Now that the reviewer has freely dealt with Carl Clemen's limitations, he wishes to say that he has not done it with the intention of fault-finding, and it is only fair that he should acknowledge his own. His defect has been weak German, which he took up only in

his thirties. By reason of this he did not pay proper attention to Clemen's German edition in 1909, or he (the reviewer) would not now be lamenting his deficient recognition in an important work which possibly people will swear by for the next ten years. But we must be patient with the slowness of research. As the writer has elsewhere observed:

> Be patient, man! The star-lore time is slow,
> And like her cycles is the silent flow
> Of all our learning down the centuries:
> Millions of minds must think before we know.

As it is we cannot but be grateful to Clemen for having sifted out so much and given us such an interesting summary of the many loans which Christianity has made from older faiths.

ALBERT J. EDMUNDS.

ENGLISH AS A UNIVERSAL LANGUAGE.

While the editor of *The Monist* was abroad two years ago he attended the Monist Congress and found there a few Americans, among them the late T. B. Wakeman, of Coscob, Conn., Prof. Jacques Loeb, of New York, and Lester F. Ward, the well-known sociologist.

Professor Loeb lectured on the physical world-conception, and pointed out how physical science is on the verge of constructing organisms. The facts which he communicated concerning artificial fertilization and other interferences with the structures of organized life were extremely interesting. Professor Jodl, of Vienna, advocated monism not as is usually done from the standpoint and in behalf of natural science, but from the standpoint of the ethicist and the philosopher. His need of consistent thought had led him to adopt monism, and his arguments appealed strongly to the audience.

It is a striking feature of German congresses that English is very little spoken and lectures are scarcely understood unless they are given in German. The French speaking delegates have a better chance of being understood, and considering these facts we regret to say that there is not yet a good means for people of different languages to communicate with each other. At that time we expressed the view that English is the best fitted medium for international purposes, and with reference to this comment, Mr. Wakeman in a personal letter called attention to the significance of this subject, which he wished to be brought before the public.

He wrote:

"Among the incidents that added to my wisdom and courage was your very interesting conversation at the 'Fahrhaus' on the propriety of an effort to induce all civilized peoples, in addition to their own language and as a completion thereof, to have a revised and practical form of the English language taught in their schools as the universal language of science and humanity, and of general international intercourse. I think you made it clear that this step is demanded by the nature of the language itself as well as by the fact of its very general use now, and its inevitable promise in the future. The fact that you were a German of the Germans by birth, inheritance and scholarship, who did not become acquainted with English until you had reached your middle life, and that your conviction is the result of an impartial examination of the facts and reasons *pro* and *con*, against your early prepossessions, marks you as the proper one to open up a general consideration of the subject. The proper time to do that is certainly the present, when monism is making some general means of communication a practical necessity, which it seems no limited and artificial language can reach."

While on the subject of universal languages it is well to note that in the opinion of many Esperanto and Ido have been superseded by a newer rival called simply "Universal." This is the invention of Dr. H. Molenaar, a Bavarian, and claims to be easier to learn and more international than Esperanto. Since it is supposed to be intelligible to those who can speak only English, we here quote a few sentences from a postal card published for advertising purposes:

"Universal-ling es plus simpl, plus fazil, plus kurt, plus praktik ke tut altr universal-ling-sistem; es komprensibl sin stud a tut kultivet European e Amerikan; hab leplus simpl gramatik imaginabl; son vokabular es komun a mult lingi; es non min fazile parlet ke skribet; es un exelent preparazion pro stud de Latin e de tut altr ling oxidental; es egale bon pro zienz, literatur e komerz; es aprendet in pok hori."

Dr. Molenaar has undertaken two periodicals in the interest of his new language; one, *Universal*, was started in 1907 and two years later he branched out into a more ambitious magazine, *Humanitat*, which the secondary title describes as an *organ pro tut interesi humanitar e internazional.*

Another recent attempt at constructing an international language is the *Interlingua* which flourishes under its director, G. Peano, professor in the University of Turin, and its vicedirector and treasurer. Dr. Prof. G. Pagliero, Via S. Francesco 44, Turin. This

language is made up almost entirely upon Latin roots although it admits some others in its vocabulary. For further explanation we quote from the *Interlingua* circular the following paragraphs.

"Latino es in parte internationale, et in parte mortuo. Scriptore, que adopta toto vocabulario latino, cum grammatica simplice, es intellecto ab lectore que consulta vocabulario latino, sed non intelligibile ad primo visu. Pro scribe in modo subito intelligibile, es necesse vocabulario de latino internationale. Academia judica internationale omni vocabulo latino existente in vocabulario etymologico de anglo. Latino et anglo es duo extremitate, in tempore et spatio, de lingua internationale.

"Vocabulario latino-anglo pote es substituto, sine errore sensibile, per latino-français aut latino-italiano etc. Vocabulo latino, vivo in nostro lingua, es bono. Si vocabulo latino es mortuo, quære æquivalente in dictionario de synonymos. In ipso vocabulario latino-nationale, ad voce nationale, sæpe responde plure synonymo latino et viceversa.

"Academia adopta omni voce internationale, et non scripto in vocabulario latino ad usu de schola, per exemplo: *reale* (ex L. *reale*) *acephalo* (ex Græco), *telegrapho* (ex. G. *tele graph -o*), *artista* ex L. *arte* et G. *-ista*),*algebra* (L. math. ex Arabo), *tabaco* (L. botanico ex Americano), etc."

THE MULTIPLICATION OF PEARS AND PENCE.

We are in receipt of an open letter by Frederick Hovenden which attacks most vigorously the present system of teaching algebra. It contains a passage of interest to both mathematicians and physicists, serving to stimulate thought on a problem which has perhaps not been sufficiently understood.

Mr. Hovenden offers a prize of 500 pounds, a goodly sum, to any one who will perform in public the act of multiplying apples and pears by pence, or any similar trick in which our common school algebras abound. He holds this and similar absurdities up to ridicule and we must say we have rarely seen any practical development of science made sport of with a greater semblance of justice. Our algebra works all right in practical life and yet we wonder whether Mr. Hovenden's challenge will not be taken up by some one who believes in algebra.[1]

[1] We intended to publish a quotation from the original text of Mr. Hovenden's pamphlet, but it has mysteriously disappeared in the ever-yawning

In comment on his severe accusation we wish to say that physical formulas such as the Kepler laws, the laws of gravitation, the laws of motion, etc., employ letters such as *g* for gravity, *t* for time, *d* for distance, etc. But we must bear in mind that these symbols, unlike the letters of algebra, do not stand for the things of which they are abbreviations, but for the number of units of time, distance, etc. The symbol *g* is simply an abbreviation for the number of feet representing the initial velocity of a falling body on earth. In a formula such as $1/2\,gt^2$ we do not multiply time by gravity, which would be nonsense, but we multiply the number of seconds represented by *t* with the number denoting the initial velocity of gravity. This is a big difference, for it would be quite difficult to multiply time by gravity or by mass or any other item which has been abbreviated in the nomenclature of physics by a different letter. The laws of algebra hold good for the formulas of physics, but for all that the physical formulas are quite different from algebra, and have an application of their own.

The science of algebra is an *a priori* construction, and each letter denotes some magnitude of its own which is handled according to the laws of arithmetic, and can be inserted when the conclusion has been made, in which case it will find any magnitude on condition that it remains consistently the same throughout the calculation. It is quite amusing to think that in algebra we are expected to multiply objects such as tables and chairs, or apples and pears, and it would indeed be difficult to comply with the hanky-panky trick in public. Mr. Hovenden's 500 pounds are pretty safe in his pockets if he will pay them only for performing this remarkable feat, but it might have been better for our comprehension of the nature of physics as well as of algebra to offer that same sum for a sensible and clear explanation of the problem which puzzles the vice-president of St. Luke's Lunatic Hospital.

* * *

We sent a copy of these few remarks to Mr. Philip E. B. Jourdain, of Cambridge, England, partly in the hope that he might help us to locate Mr. Hovenden's letter. He makes the following additional comments:

"Hovenden's strictures on the use of symbols in algebra and physics are quite just, and your remarks also seem to me very much to the point. It is very curious that an explanation of Hovenden's

mouth of the editorial waste-paper basket or at the hands of the printer's devil.

difficulty is so rarely given. For this reason, I think the following quotation from De Morgan's *Elements of Algebra* (London, 2d ed., 1837, p. ii) is worth making:

"'How many of the operations of arithmetic can be performed with concrete numbers, and without speaking of more than one sort of 1? *Only addition and subtraction.* Miles can be added to miles, or taken from miles. Multiplication involves a new sort of 1, 2, 3, etc., standing for *repetitions or times,* as they are called. Take 6 miles 5 times. Here are two kinds of units, 1 mile and 1 time. In multiplication, one of the units must be a number of repetitions or times, and to talk of multiplying 6 feet by 3 *feet,* would be absurd.[2] What notion can be formed of 6 feet taken "3 feet" times?

"'But in solving the following question, "If 1 yard cost 5 shillings, how much will 12 yards cost?" do we not multiply the twelve *yards* by the five *shillings*? Certainly not—the process we go through is the following: Since each yard costs five shillings, the buyer must put down 5 shillings as often (as many *times*) as the seller uses a one-yard measure; that is, 5 shillings is taken 12 *times.*

"'In division, we must have the idea either of repetition or of *partition,* that is, of cutting a quantity into a number of equal parts. "Divide 18 miles by 3 *miles,*" means, find out how many *times* 3 miles must be repeated to give 18 miles; but "Divide 18 miles by 3," means, cut 18 miles into three equal parts, and find how many miles are in each part.

"'18 miles divided by 3 *miles* gives 6; meaning, that 3 *miles* must be repeated six *times* to give 18 *miles.*

"'18 *miles* divided by 3 gives 6 *miles*; meaning, that if 18 miles be cut into *three equal parts,* each part is 6 *miles.* The answer in abstract numbers is the same in both cases; 18 divided by 3 gives 6.'

"It might also be mentioned that Mach (*Mechanics,* p. 144) expresses himself accurately about s/t, but, as a rule (cf. p. 269), follows the usual procedure of mathematics and uses less accurate expressions simply for the sake of shortness. The difficulty seems to me to arise partly from the neglect of the use of *proportions* instead of *equations* (cf. Mach, p. 157) as I remarked in my little book *The Nature of Mathematics,* pp. 62-64."

[2] "'In old books the following is sometimes found. "What is £99. 19s. 11¾d. multiplied by £99. 19s. 11¾d.?" The only intelligible meaning of this is as follows: If a stock of money is to be increased at the rate of £99. 19s. 11¾d. for every £1 in it, how much will that be when the stock itself is £99. 19s. 11¾ d.? Let the student answer this.'"

SCHILLER'S PHILOSOPHICAL POETRY.[1]

[Friedrich Schiller's poetry became with his maturer years more and more philosophical, and as the most illustrious child of his muse we have published in April, 1911, his famous hymn "The Ideal and Life" which we hereby wish to complement with some pertinent remarks by one of the foremost Germanists of this country, Prof. Calvin Thomas of Columbia University, New York.—ED.]

The dominant note of Schiller's later poetry is intellectual seriousness; wherefore, if there be those for whom intellectual seriousness is not a quality of poetry at all, for them he has not written.

Of course his verse is self-revelation, without which poetry cannot be; but it is the revelation of a soul dwelling habitually in the upper altitudes of thought and emotion, and always assuming that fellow-mortals who care for poetry at all will be capable of a serious joy in the things of the mind.

One may say that his art as a poet consists not so much in the direct expression of feeling in sensuous and passionate language, as in the transfiguration of thought by means of impassioned imagery. In his poems as elsewhere he is a good deal of a rhetorician, but he is never insincere. His verse came from the heart, only it was the expression of character and convictions rather than of moods and fancies. It seems intended to edify rather than to portray; to impress rather than to delight. Some of it, too, is occupied with ideal sentiments so abstract and sublimated as to possess but languid interest for normally constituted lovers of poetry.

This last observation has in view more particularly the poems he wrote in the year 1795, while still "hugging the shore of philosophy." Take for example "The Veiled Image at Sais," which tells in rather prosaic pentameters of an ardent young truth-seeker who is escorted by an Egyptian hierophant to a veiled statue and told that whoso lifts the veil shall see the Truth. At the same time he is warned that the veil must not be lifted save by the consecrated hand of the priest himself. Moved by a curiosity which can hardly seem anything but laudable,—unless one is prepared to take the side of the sacerdotal humbug,—the young man returns in the night and raises the veil. In the morning he is found pale and uncon-

[1] See the author's *Life and Works of Schiller,* New York, Henry Holt & Company.

scious at the foot of the statue. Soon afterwards he dies, leaving to mankind the message:

"Woe unto him who seeks the Truth through Guilt."

Far more interesting is the poem which was at first called "The Realm of Shades" and later "The Ideal and Life,"—a difficult production, which resembles "The Artists" in its suggestion of a voyage through the imponderable ether. We begin with the blessed gods in Olympus and end with the apotheosis of Hercules; and the intervening stretch is like the vasty realm of the Mothers in "Faust." The poem is intellectual, in the sense that its theme is a concept of the mind, and its structure logical throughout; yet every strophe is surcharged with feeling, and the diction presents a marvelous wealth of imagery. It must be conquered by study before it can yield any great pleasure; but the conquest once made, one finds a noble delight in the gorgeous coloring with which Schiller invests his idealistic rainbow in the clouds. Good critics, favorable to Schiller's genius, regard "The Ideal and Life" as the greatest of his philosophic poems and the most characteristic expression of his nature. He himself felt a sort of reverence for it. "When you receive this letter," he wrote to Humboldt, "put away everything that is profane and read this poem in solemn quiet." And Humboldt replied: "How shall I thank you for the indescribable pleasure that your poem has given me? Since the day on which I received it, it has in the truest sense possessed me; I have read nothing else, have scarcely thought of anything else."

The general drift of the wonderfully pregnant verses is that man attains peace only by renouncing the things of sense and living in the realm of shades, that is, among eternal ideals. Here he is free—like the gods.

Throughout the poem "Beauty" is put for "the Ideal"; and we get a reflex of the philosophic doctrine that only the esthetic faculty can resolve the eternal conflict between the sensuous and the rational man. Life is and must be struggle, that being its very essence; but by taking refuge in the Realm of the Ideal, man anticipates his apotheosis. There he escapes from the tyranny of the flesh and the bondage of nature's law. The misery of struggle and defeat no longer vexes him. The warring forces are reconciled and he sees their conflict under the aspect of eternal beauty. Thus, like the new-born god, Alcides, taking leave of the terrestrial battle-ground, he mounts into heaven, while the nightmare of the earthly life "sinks and sinks and sinks."

All this may seem, at first blush, to attach excessive importance to the attainment of inward peace and harmony,—as if one's private comfort were the greatest thing in life. It *seems* to recommend a quietistic, contemplative life; for how else shall one escape from the actual into the ideal? Nevertheless it would be a great mistake to read into the poem anything like a recommendation of quietism. The ultimate goal is described in terms which suggest now the mythology of Homer, now the Platonic realm of ideals, and again the Christian heaven; but however the blessed existence is imaged, it is always thought of as attainable only through a strenuous grapple with the realities of this life. Thus the essential spirit of the poem is the spirit of energetic, hopeful endeavor. Its doctrine is, to quote the words of Kuno Francke, that "only through work are we delivered from the slavery of the senses"; that "the very trials and sufferings of mankind bring out its divine nature and insure its ultimate transition to an existence of ideal harmony and beauty."[2]

The doctrine, in its essence, was dear to Goethe, as well as to Schiller, and takes us into the holy-of-holies of their joint philosophy. What else did Goethe mean by his oft-reiterated preachment of renunciation, and by his well-known verses about "weaning oneself from the half and living resolutely in the whole, the good and the beautiful"? In his excellent book upon Diderot Mr. John Morley speaks somewhere of "that affectation of culture with which the great Goethe infected part of the world." Let it not be forgotten, however, in our latter-day contempt of culture, that the Weimar poets were great workers, and also, in their way, great fighters. They did not turn their attention—at least not directly—to the crushing of the Infamous, nor to any battle against social or political wrong. They fought rather for sanity, for good art, for philosophy; for those things which go to enrich and broaden the life of the individual. It was a good fight,—the best which, at their time, with their gifts, they could possibly have engaged in.

Schiller's fervid verses, recommending an escape from the bondage of sense to the free realm of the mind, correspond of course to nothing that is humanly feasible. The shackles of the flesh are upon us and there is no way to get rid of them. It is only an ideal, a poet's dream. Nevertheless the subject has a practical aspect which is definable in plain prose. It is found in the following passage from Goethe:

"We put one passion in place of another; employments, dilet-

[2] *Social Forces in German Literature*, p. 376.

tantisms, amusements, hobbies,—we try them all through to the end only to cry out at last that all is vanity. No one is horrified at this false, this blasphemous saying; indeed it is thought to be wise and irrefutable. But there are a few persons who, anticipating such intolerable feelings, in order to avoid all partial resignations, resign themselves universally once for all. Such persons convince themselves with regard to the eternal, necessary, law-governed order of things, and seek to acquire ideas which are indestructible and are only confirmed by the contemplation of that which is transient."[3]

CALVIN THOMAS.

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PROBLEMS OF PURE FORM.

AN EDITORIAL DISCUSSION WITH M. LUCIEN ARRÉAT AND G. A. BLACK.

The Editor has received two comments on his exposition of the nature of mathematics. One comes from M. Lucien Arréat, who objects to the idea that the triangle is a product of three lines on the ground that it consists of a section of the plane bordered by three lines.

We translate from M. Arréat's letter: "Is it quite correct to consider *lines* as *elements* which produce the triangle? By construction the lines bound a portion of space, but they do not produce this portion; they only define the figure conceived or indicate directions. Lines do not seem to me to be real in any different sense than the figure which they render visible to our eyes. They do not seem to me to be a quantity while the figure which they ideally define would be a quality. These remarks do not however in the least prevent us from studying the triangle as a type of form."

Lines have qualities such as direction. The line consists of length without breadth or thickness, and lines can be measured quantitatively according to their length. When three or more lines intersect they produce geometrical figures, and these geometrical figures possess new qualities not to be derived from their elements which in this case are mathematical lines.

What M. Arréat calls the triangle is really the contents of the triangle, viz., its area enclosed by the sides. The character of the triangle consists of the direction and the length of its three sides

[3] *Dichtung und Wahrheit*, Bk. XVI.

with all the relations they imply. The triangle cuts out of the plane an area of a definite shape, and it possesses a great number of qualities determined by the interrelation of the sides, such as definite angles and perpendiculars, and it has a definite inscribed and a circumscribed circle, besides ascribed circles, etc., the sides extending beyond the three corners into infinity.

The other comment is offered by Mr. George Ashton Black who writes as follows:

"A passage on page 9 of your pamphlet entitled *The Philosophy of Form* moves me to send you the following remark:

"The assemblage of cognitions properly named and ordered by you

plane
straight line —
parallel lines =

is necessary and sufficient to construct mathematically Kant's metaphysical theory of cognition generally, meaning his enumeration of the different successive steps in the process of making any object by degrees completely known according to a constant rule. Witness

$$\text{ideal} \begin{cases} \text{intuition} & \text{synthesis} \\ \text{concept} & — \text{ analysis} \\ \text{idea} & = \text{ dialectic} \end{cases} \text{ method}$$

where the same cognitions, considered from two different points of view, are regarded on the one hand as determinations of a known object; on the other as acts of a knowing subject.

"Accordingly the classic symbol of equivalence (=) as a fact or thing done is the norm or prototype not merely of mathematical science, but even of any science whatever; and the actual production of it by degrees is the simplest possible real use and practical application of the scientific method complete."

Mr. Black's proposition that the plane, the straight line and parallel lines are all the essentials needed for constructing the metaphysical aspects of the Kantian world-conception will scarcely be contradicted if we agree on the term metaphysical. It is interesting to see that in other realms of purely formal thought, especially in logic, the Euclidean character of space is assumed to hold good, and is more closely connected with the foundation of logic than may appear at first sight. Note that the logical figures are all in the shape of mathematical constructions in a plane. The figures of logical reasoning which serve as arguments are circles or squares illus-

trating the relations of genera and species, the former enclosing the latter and explaining in a visible shape their interrelations and the deductions made therefrom. All these arguments presuppose that lines can be made to return to themselves; they are based on the condition that lines may lie in one and the same plane and may constitute figures bound up in definite limits. They presuppose a space not necessarily Euclidean but of a continuity which does not permit the contents to skip out into a third dimension. It is true that the logical diagrams are mere illustrations, not proofs, but if illustrations do not hold good, we have no ground for classifying objects or making any generalization. The idea of form is at the bottom of all thinking, and the assumption of the possibility of a sameness of forms alone justifies us in speaking of "*All A*" and drawing the conclusion that if all A's are B then every single A is B. P. C.

CURRENT PERIODICALS.

In *Mind* for April, S. Alexander continues his paper on "Collective Willing and Truth." J. S. Mackenzie, in a paper entitled "A Sketch of a Philosophy of Order," advocates, "in a brief and somewhat tentative fashion, a point of view that has at least proved helpful to myself in the effort to understand these apparently simple but in reality most difficult problems"—the nature of truth and error and of relations. "It has been my endeavor," he says in conclusion, "to exhibit certain fundamental conceptions as being involved even in the simplest facts of experience; and to show that reflection on them leads us gradually to the recognition of a certain ideal order, which is at least the foundation of our moral aspirations, and may perhaps serve as a basis for an idealistic or spiritual interpretation of the universe. My contention is that there is nothing even in sense which does not already imply something of the nature of an ordered universe. Such an idealism does not seem to be in any way opposed to what is commonly called realism; and it seems to me that we may find in this method of treatment a possible conciliation between views that are usually regarded as antagonistic." The Rev. Oliver Quick has an article on "Bergson's *Creative Evolution* and the Individual." Howard V. Knox writes an appreciation of "William James and his Philosophy," and concludes: "After all, James might well be content to rest his title to fame on his having translated the question 'What makes knowledge possible?' into

the question 'What makes knowledge credible, and conduct possible?' That is what in the history of philosophy will be known as James's Answer to Kant; and there are those who believe that it will rank as more epoch-making than Kant's irrelevant Answer to Hume. In a word, to James belongs the glory of having first divined the Secret of the Plain Man, and ministered to his desire for a knowledge that is relevant to action and to life." In the "Discussions," F. C. S. Schiller replies to his reviewer R. F. A. Hoernlé, L. S. Stebbing replies to his critic F. C. S. Schiller, and G. R. F. Ross and C. H. Rieber have some critical remarks on a logical article by C. E. Hicks in *Mind* for 1912 on Euler's circles and inversion. A short note at the end by C. D. Broad on Zeno's puzzle of Achilles and the Tortoise is interesting since "it is important, even at this time of day, to settle the controversy finally, because it and Zeno's other paradoxes have become the happy hunting-ground of Bergsonians and like contemners of the human intellect." Russell's version of the puzzle in his *Principles of Mathematics* is that the supporters of the Achilles paradox are trying to prove that the course of the tortoise can never be a proper part of that of Achilles because the construction shows that each has the same number of points; while an infinite class and a proper part of itself can have the same number of terms (Cantor and Dedekind). But Broad thinks that the difficulty which many intelligent persons feel lies in the supporters' advocacy of the plausible but false proposition that "what is beyond every one of an infinite series of points must be infinitely beyond the first point of the series."

* * *

In the *Revue de Métaphysique et de Morale* for March, Gustave Belot begins his article on the idea of God and atheism from the critical and social points of view by announcing that his thesis would have reduced him to penury a hundred years ago; it would have brought him to the Bastille two hundred years ago; and would, perhaps, have brought him to the stake 300 or 350 years ago. And yet his thesis is not very subversive: his object is to show that the fear of atheism is chimerical. "Every new affirmation of God presupposes some provisory and relative atheism. The fear of atheism is perhaps the most profound atheism." Albert Rivaud has a long and detailed article on Paul Tannery, historian of ancient science. Tannery undertook to study in a general manner the history of ancient science; and pursued simultaneously four series of distinct but connected researches: on the history of mathematics and their

applications, on the history of astronomy and physics, and on ancient metrology. Death interrupted him just when he was beginning the history of ancient medicine. It is interesting to see that Tannery maintained in *Pour l'Histoire de la Science Hellène*, Paris, 1887, pp. 249, 250, 258, that the well-known paradoxes of Zeno are not sophisms, but are clear and irrefutable arguments against Pythagoreanism. Léon Robin maintains that Plato was not, as he is too often represented, one of the most brilliant legislators of the country of Utopia, but a philosophical and scientific social reformer. Louis Couturat points out that the logical problem raised by Ginzberg in the *Revue* for January has been long resolved by logisticians. Couturat also has a long paper on logistics and intuition in which he points out the error of people like Henri Poincaré and Pierre Boutroux in a way that may be summed up: "The error of the adversaries of logistics arises from the fact that they oppose logic to discovery." Cf. *The Monist* for October, 1912. Léon Brunschvicg discusses the practical question of the organization of the republic according to the works of Henri Chardon on administrative reform.

In the *Revue* for May, Pierre Boutroux has an article on the object and method of mathematical analysis, which forms three chapters of a forthcoming work. These three chapters are on the origins and rôle of algebra, the progress of algebraical synthesis, and analysis. G. Gastinel has a long and critical article on esthetics and sociology, in which he takes as text the *Introduction à l'Esthétique* of Charles Lalo. François d'Hautefeuille, in a paper on the inner life, which is a sequel to a previous paper whose object it was to show the insufficiency of the sociological conception of morals—which rises from inaptitude to place oneself at the point of view of the inner life—, tries to penetrate the importance of this life and understand its nature and the close union of its domain to that of morals. A. Mamelet contributes the fourth and last of his articles on the philosophy of Georg Simmel. Finally, G. Cantecor discusses the question of suicide for the purpose of comparing religious and lay morals.

* * *

In *"Scientia"* (*Rivista di Scienza*) for May, the first article is by Bertrand Russell "On the Notion of Cause." The law of causality, he says, is—at least as usually stated by philosophers—false and is not employed in science. Indeed, "the word 'cause' is so inextricably bound up with misleading associations as to make its complete extrusion from the philosophical vocabulary desirable.

....The law of causality, I believe, like much that passes muster among philosophers, is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm." Then there follows a most amusing criticism of the definitions of terms relating to the subject in Baldwin's *Dictionary*. Scientific laws, instead of stating that one event A is always followed by another event B, state functional relations between certain events at certain times and other events at earlier or later times or at the same time. In the case of a system of gravitating particles, "certain differential equations can be found, which hold at every instant for every particle of the system, and which, given the configuration and velocities at one instant, or the configurations at two instants, render the configuration at any other earlier or later instant theoretically calculable. That is to say, the configuration at any instant is a function of that instant and the configurations at two given instants. This statement holds throughout physics, and not only in the special case of gravitation. But there is nothing that could be properly called 'cause' and nothing that could be properly called 'effect' in such a system." On this point, we may refer to Russell's *Principles of Mathematics,* Cambridge, 1903, pages 477—479. The "law of causality" seems to be capable of translation by the principle: "There is a constant relation between the state of the universe at any instant and the rate of change in the rate at which any part of the universe is changing at that instant, and this relation is many-one, i. e., such that the rate of change in the rate of change is determinate when the state of the universe is given." This principle cannot be considered as *a priori.* Calling the above certain events at certain times "determinants," the author sums up his further results as follows: "We found that a system with one set of determinants may very likely have other sets of a quite different kind, that, for example, a mechanically determined system may also be teleologically or volitionally determined. Finally we considered the problem of free will: here we found that the reasons for supposing volitions to be determined are strong but not conclusive, and we decided that even if volitions are mechanically determined, that is no reason for denying freedom in the sense revealed by introspection, or for supposing that mechanical events are not determined by volitions. The problem of free will *versus* determinism is therefore, if we were right, mainly illusory, but in part not yet capable of being decisively solved."

Emmanuel de Martonne points out that the climate has at least as

much effect as the sub-soil in putting the soil into that relief which is usually explained geologically. Frederick Soddy, in an article on "The Periodic Law from the Standpoint of Radioactivity," gives an interesting account of how, in 1913, and principally as a consequence of the work of A. S. Russell, G. von Hevesy, K. Fajano, Soddy himself, and A. Fleck, a great generalization has been made with regard to the position in the periodic classification occupied by the 34 radioelements now recognized. This advance sheds a flood of new light on the nature of the periodic law and already more than half answers the riddle underlying that law. The generalization in question is: All members occupying the same place in the Periodic Table are non-separable from one another by chemical methods, and are chemically identical with one another, though their atomic weights vary over several units. Such groups of non-separable elements could not be separately recognized unless they were actually in the process of change the one into the other. A. Prenant gives an account of the physical, as opposed to the vitalistic, explanations of cell-division (mitosis), and concludes that every one of these explanations leave something to be desired. Franz Oppenheimer gives a criticism of Marx's theory of plus value. G. Cardinali, in an essay on the repercussions of imperialism on the inner life of Rome, points out the one-sidedness of historians, and tries to make it easier for one to get a clear view of the essential values and characteristics of the period of the Roman Empire. V. Cornetz replies to some points in an article by H. Piéron on orientation with ants. Michele Gortani gives an account of recent progress in geodynamics. Reviews, etc. fill up the rest of the number. ϕ

CORRESPONDENCE.

DISCUSSION BY THE FRENCH "PLASMOGENISTS" ON THE ORIGIN OF LIFE.

> In the field of spontaneous generation, we have reopened once for all high roads across which backward, retrogressive minds had raised barricades declared by them insurmountable!
>
> Albert and Alexander Mary.

When in the year 1883, in his monthly illustrated review, *L'Astronomie*, Camille Flammarion replied to Mr. Faye concerning the grand problem of the existence of multitudinous inhabited worlds in the cosmos, he affirmed that all the sidereal spheres passed through

a period of nebular life, and that on cooling they reached a phase of organic genesis and evolution followed by an ultimate era of decrepitude and death by glaciation. In venturing into such a generalization, Flammarion committed an error almost as serious as that made by his opponent when he affirmed that organic life was a special privilege granted by God to this planet, a phenomenon unique in its kind, whose recurrence was practically impossible upon other worlds!

It should have been guessed long ago by scientists that all the shining sidereal bodies to be seen with the naked eye or the telescope —the planets of our system excepted—are bodies which, owing to their enormous sizes, produce and radiate considerable pressure-heat with which they can swallow an ever-growing quantity of cosmic materials. Far from cooling and dying in the future as stated gratuitously by Mr. Flammarion and others, our sun is doomed to increase in size, absorbing its planets one by one, together with an always larger quantity of cosmical dusts; and at the same time to grow warmer and warmer, more and more resplendent. All self-luminous sidereal bodies in the sky, all those stars whose surface is a molten, igneous, radiating furnace, will keep their heat for a long time at practically the same thermic degree as at present, and will afterwards increase in pressure-heat more or less rapidly. As the pressure of the surrounding ether upon their surfaces cannot produce motion, it produces pressure-heat. The ether-pressure upon a sidereal body concentrates itself upon spherical areas constantly diminishing in size from its surface to its center. If the internal pressure-heat of a sidereal sphere was exactly proportional to the pressures supported, it would be quite tremendous at the center of big spheres like our sun. But such pressure-heat always spreads itself into the whole of the internal mass as it is produced, so that there is always a certain equality in the temperature of the whole mass of the big, molten sidereal bodies.

This being granted, it is easy to realize that there are no dead suns, as Professor Bickerton admits. All dead sidereal bodies are too small to be suns. Such is the case with Mars, the Earth, Venus, Mercury. It may be thought that our own planet has practically reached its equilibrium in temperature, that the pressure-heat it radiates will now remain unaltered. Recent observation has shown beyond doubt that Jupiter and Saturn must be placed among the self-luminous stars. When seen with the telescope, they look indeed like little suns. It is now quite certain that their molten surfaces

are and will remain always blazing furnaces, by far too hot to bring forth living beings.

If, contrary to accepted theories, the sidereal spheres, when big enough, are destined to grow warmer and warmer, the geological strata of the earth-crust and their fossils show us sufficiently that our planet has grown colder and colder since the primordial ages. At present, scientists generally admit the hypothesis of a vast primordial ocean which during long ages enveloped the whole surface of the spheroid with its thick liquid mantle. As soon as the temperature of the oceanic waters had fallen to the thermic degree at which organic life could arise, a spontaneous genesis of rudimentary living beings took place everywhere in its bosom, owing to the contribution of air, water, salts dissolved into water, the ooze of the marine abysses and, of course, imponderable ether. All the ancient cosmogonies of the Orient seem to have had a correct idea of such a phenomenon. They considered water as the medium into which living beings began, the element of which they are made; they worshiped it as the female goddess over which hovered the spirit, the creative wind, the male god, the active principle: ether, air, fire and light.

In the so-called "epoch-making" address he delivered last year in Dundee, Professor E. A. Schafer pointed out that there was no valid reason to suppose that life had appeared on the surface of our planet at any single period of its past history, owing to a special concurrence of favorable circumstances. If indeed, at a certain moment of our planet's existence, so-called living substance could spring up from inorganic matter, is it reasonable to affirm that spontaneous generation cannot take place again and again, in the present and future life of the earth? If the president of the British Association is still unable to tell us exactly when and where organic life made its appearance upon our globe, we can affirm to-day without hesitation that life springs up by itself when ether and ponderable matter combine, and that thousands of years are not required for the formation of a low form of living beings with a calcareous coat or simply of structureless naked monera, as Prof. E. A. Schäfer seems to believe. No doubt he does not know that lately microscopical observation has shown that in our times the phenomenon of spontaneous generation is still constantly occurring, not only in oceanic waters from the inorganic waste which owing to its specific weight falls into the abysmal depths, but in the mud of putrid waters as a structureless reticulum which divides itself and reunites

at will. We may say here that we do not agree at all with Professor Schäfer when he shows a marked preference for Pasteur's experiments on spontaneous generation over those of Bastian. If Professor Schäfer is convinced of the accuracy of Pasteur's results in his experiments with sterilized liquids, we personally are fully convinced that the conclusions drawn by Pasteur from his experiments were erroneous. But Professor Schäfer himself recognizes that previously to Pasteur many scientists believed in the existence of spontaneous generation. Pasteur came and at once the minds of the scientists found themselves magically sterilized. On the other hand it is clear that the solutions contained in Doctor Bastian's sealed vessels are perfectly sterilized by temperatures as high as 110° C. to 130° C. and upwards. It is absolutely impossible for the so-called organic "germs" observed afterwards by Dr. Bastian in his tubes to have resisted such high temperatures. Again Professor Schäfer commits the mistake of believing that Bastian's organisms, born *de novo*, are highly differentiated organisms. Has not the recent synthesis of Koch's bacillus by the Mary Brothers shown that the so-called microbes are only groups of micellæ with a definite general morphology?

All those who want to know the latest marvels of spontaneous generation should read the admirable works by Albert and Alexander Mary on transformism and synthetic biology.[1] They are no doubt the best of their kind. Quite similarly to Stephane Leduc, whose "pseudophytes" are now well known all over the world, Messrs. A. and A. Mary in their turn, having thrown salt-granules or salt-dusts into salt-solutions of various kinds, succeeded in bringing to life pseudo-organisms showing all the phenomena to be seen in nature. Thus they have added a new and most interesting chapter to plasmogeny, the science of protoplasmic genesis, which though still in its childhood, is already pretty well grown. In a recent pamphlet,[2] Prof. Alfonso Herrera, of Mexico, who laid the foundations of this new science, has included all the sciences under the term plasmogeny. For him, the word is synonymous with natural philosophy.

Destroying all the artificial classifications established so patiently by learned Latinists or Hellenists, breaking up one by one the thin walls of the numerous scientific cells into which the "doctors" were pleased to confine themselves, the logic of accomplished facts at last compels many scientists to recognize that there exists no sharp line

[1] Paris. Jules Rousset, publisher, 12 Rue Monsieur le Prince.

[2] *A ciencia nueva, la plasmogenia.*

between the various branches of science, that all departments of human knowledge are bound with one another, that some day in the future they will unite logically into a single whole because the cosmos itself is a single whole, composed of units made of a unique substance, though infinitely varied in qualities and properties. At present it appears clearly to everybody that so-called "dead matter" cannot be considered as chemically distinct from "living substance." It is well known to-day that the minerals feel, eat, grow, decay and die in the same way as animals. Have not Messrs. Mary compared the contractions of fresh-water amebas to the movements of fuchsine drops thrown into potassium silicate? Have they not recognized recently that the precipitates obtained from many chemical reactions have already a colloid or organic structure? When studied with a microscope, such precipitates show themselves to be composed of multitudinous micellæ, either spheroid or ovoid, whose bulk and shape are similar to those of the micellæ of which adult protoplasm is composed. It is very interesting to note that Messrs. Mary admit that these new molecular structures result from atoms of oxygen, hydrogen, and very likely of ether aggregating with the atoms of the insoluble salt.[3] This is indeed an inference of capital import; it opens new horizons in the almost virgin regions of atomistic chemistry. It was known long ago that in certain particular cases, a mineral can act as an ordinary living organism. When the electric current passes between two platinum electrodes plunged into liquid water, microscopic granulations are formed. Such granulations are fermenting agents greatly resembling fermenting bacteria (colloidal platinum). Has not Charles Edward Guillaume himself remarked that metals may show well-marked evidences of life from birth to death, of sensibility, will, youth, maturity and decay? Has not Leduc affirmed that a common stone, when touched by his finger, responded to the contact with a slight expansion? But is not the neo-dynamist school itself able to prove that a ponderable body, gravitating freely towards the earth, is not passive under the pressures of the ethereal atoms which surround it? It is opposing to these pressures its inertia, which is already an active force. It tends to recover its balance of its own accord when its mass opens its way through the warmest and most expanded ether, which is less energetic in its repulsions.

If Professor Schäfer's address seemed so revolutionary when he declared that the abyss separating the inorganic from the organic

[3] *La Terapeutica Moderna.*

world is filled, is it not because the intellectual world in England is in general insufficiently aware of the intellectual and philosophical movement on the Continent, in the present day? It is conceivable that our descendants in two or three generations will be very much amused to learn that in the year 1912 all the press of London was stirred up for a fortnight because a renowned professor solemnly declared from the rostrum that the ameboid movements of the protista were similar to the movements of oil-drops, of mercury-drops, of the corpuscles of the blood, and of our muscles, when contracting. Yet, is it not sufficient for us to go to the Kensington Museum and examine attentively the minerals of all kinds exposed there to become immediately convinced that the inorganic world has already its rudimentary life, though infinitely diversified as it is in the vegetable and animal kingdoms?

The hypothesis of the rudimentary life of atoms once admitted, we are then enabled to go far beyond Professor Schäfer's own conclusions. We can admit, for instance, that the units constituting the so-called "simple bodies" being homogeneous both in force and volume, are vibrating in unison, that in their various states, they may have already as a vague sentiment, a remote consciousness of the unity of the material mass into which they are included. Should we not see in the chemical molecule a first degree of psychic unity, something as an embryonic conscience? Are not the water-molecule, the air-molecule, organisms—rudimentary cells perhaps, which can hold comparison with protoplasmic cells? And the crystals, what are they? Should we insist upon the analogies between crystalloids and colloids so thoroughly studied by Doctor Bastian? Are not diamond, quartz, precious metals the results of atomic transmutations which take place in the organic molecule?

In the above-mentioned pamphlet, Professor Herrera writes that he considered ether as the primordial protoplasm. Indeed, it is very reasonable to admit this wonderful imponderable substance as the leaven which gives birth to Herrera's silicate cells, Mary's pseudophytes, Burke's radiobes, Harting's corpuscles, Naegeli's colloidal platinum, Bastian's heterogenetic micro-organisms. It is ether which encloses itself in Huxley's bathybius, Mary's protameba, Haeckel's moners, Bechamp's mycrozyms, in every kind of living substance, either albuminous or not. It is ether which constitutes the animated, conscious, sensitive, active centers of all our cells and tissues. It is such subtle "spirit" which is embodied in Haeckel's cell-souls, Clemence Royer's "vitaliferous etheroids." Act-

ing as a thinking substance in the process of organic life, the fluid, elastic, plastic ether will reconcile at last materialism and spiritualism on the neutral ground of substantialism. With such ever living, acting and reacting substance, we return to the marvelous conception of the unity of force, substance and mind which the Ionian dynamists had already established more than two thousand years ago!

ARISTIDES PRATELLE.

PARIS, FRANCE.

MAGIC SQUARES MADE WITH PRIME NUMBERS TO HAVE THE LOWEST POSSIBLE SUMMATIONS.

In making magic squares of all orders with prime numbers it is evident that the sum of the series used must be evenly divisible by n; also, that the quotient must be even when n is even and odd when n is odd.

The number 2 is not used in the construction of prime magics, for, being an even number, it has no analogue among the other primes, which are all odd numbers. In seeking for a series of prime numbers suitable for making magic squares *with the lowest possible summations,* if the first n^2 primes will fill the requirements above stated, they will naturally constitute such a series. If, however, the division leaves a remainder $(=r)$, then one or more substitutions must be made among the higher prime numbers so as to increase the total by an amount equal to $n-r$ or $2n-r$ etc., always taking care to secure the smallest increase possible.

Series of prime numbers theoretically suitable for all squares up to and including that of the 12th order showing the lowest possible summations, are given in the following pages, and it is interesting to note that with the exception of squares of the 3d and 4th orders, these predetermined series of prime numbers have all been arranged in magic formation by various experts.

SQUARE OF THE THIRD ORDER.

The sum of the first nine prime numbers 1 to 23 inclusive is 99, which divided by 3 gives 33 as the quotient.

This sum is therefore theoretically suitable, but it can be demonstrated that 111 is the lowest possible summation for a

square of this order made with primes, and the required series is as follows:

1 — 7 — 13 — 31 — 37 — 43 — 61 — 67 — 73

67	1	43
13	37	61
31	73	7

Fig. 1.

By arranging these numbers in accordance with the single rule that is applicable to this order, the square shown in Fig. 1 is produced, which was first made by Mr. Henry E. Dudeney.

SQUARE OF THE FOURTH ORDER.

The sum of the first sixteen prime numbers 1 to 53 inclusive is 380, which is evenly divisible by 4, but the quotient (95) being an odd number, makes the series inadmissible. The lowest sum-

3	71	5	23
53	11	37	1
17	13	41	31
29	7	19	47

Fig. 2.

mation for this square that is known to the writers is 102 (See Fig. 2), the series for which is made by substituting 71 for 43, thus

NUMBERS OF ORIGINAL SERIES OMITTED	NEW NUMBERS ADDED	TOTALS OF NEW SERIES	SUMMATIONS
47	59	392	98
53	73	400	100
41	61	400	100
{47 53}	{59 61}	400	100
47	67	400	100
43	71	408	102

raising the total of the series to 408. This square was made independently by Mr. Ernest Bergholt and Mr. C. D. Shuldham, Wyoming, New Jersey. There are at least five other series which have

lower totals than 408 and which are theoretically suitable, but it is stated by competent mathematicians that 102 is the lowest possible summation of a square of this order made of prime numbers. These five series are, however, given below together with the one used in the square wherein S = 102, the departure from original series 1 to 53 inclusive being shown.

SQUARE OF THE FIFTH ORDER.

The sum of the first twenty-five prime numbers, 1 to 97 inclusive, is 1059 which is inadmissible. The twenty-fifth prime (97) must therefore be changed to 103, raising the total of the series to

13	61	103	31	5
71	1	17	83	41
23	79	37	7	67
47	29	53	73	11
59	43	3	19	89

Fig. 3.

1065, the fifth part of which is 213. The difficult problem of arranging this series in magic formation was solved by Mr. H. A. Sayles, Schenectady, N. Y., as shown in Fig. 3.

SQUARES OF THE SIXTH ORDER.

The sum of the first thirty-six primes, 1 to 151 inclusive, is 2426 which is inadmissible. By changing the thirty-sixth prime (151) to 173 the total of the series is raised to 2448, which gives

71	19	61	137	79	41
97	59	149	13	37	53
31	131	3	113	23	107
89	67	5	101	139	7
11	103	173	1	47	73
109	29	17	43	83	127

Fig. 4.

127	3	47	23	59	149
83	43	137	73	5	67
19	89	29	61	173	37
97	31	79	107	53	41
71	103	7	13	101	113
11	139	109	131	17	1

Fig. 5.

the quotient 408 when divided by 6. The arrangement of this series of primes in magic order was accomplished independently by Mr.

C. D. Shuldham and Mr. J. N. Muncey, Jesup, Iowa, and their different squares are given respectively in Figs. 4 and 5.

SQUARES OF THE SEVENTH ORDER

The sum of the first forty-nine primes 1 to 227 inclusive is 4887 which is not evenly divisible by 7. By substituting 233 for

139	211	43	83	149	13	61
197	1	19	199	79	157	47
173	181	67	41	71	163	3
37	7	151	89	127	179	109
113	31	131	223	137	11	53
17	167	97	5	107	73	233
23	101	191	59	29	103	193

Fig. 6.

223	3	197	61	11	13	191
79	43	41	233	163	31	109
71	193	53	113	59	137	73
19	179	7	97	149	67	181
139	47	173	167	89	83	1
151	131	101	23	29	157	107
17	103	127	5	199	211	37

Fig. 7.

227 the total of the series is raised to 4893, the seventh part of which is 699.

Messrs. C. D. Shuldham and J. N. Muncey succeeded independently in making different magic arrangements of this series as given respectively in Figs. 6 and 7.

SQUARES OF THE EIGHTH ORDER.

The sum of the first sixty-four prime numbers, 1 to 311 inclusive, is 8892 which is not evenly divisible by eight, but by

271	3	7	11	181	251	83	307
263	43	283	79	31	163	29	223
173	131	67	109	101	37	269	227
179	61	229	197	73	71	167	137
23	211	149	157	151	107	257	53
97	233	199	239	5	191	103	47
89	293	127	41	241	17	193	113
19	139	53	281	331	277	13	1

Fig. 8.

changing 311 to 331, the total of the series is raised to 8912, the eighth part of which is 1114. The magic square shown in Fig. 8 was made from the above series by Mr. J. N. Muncey. Mr. C. D. Shuldham has likewise made a square of this order by using a series

179	149	233	5	157	103	47	241
73	137	227	191	61	23	173	229
181	19	7	223	269	199	89	127
37	151	257	97	31	277	163	101
113	197	43	79	263	29	283	107
271	109	13	211	3	281	167	59
193	311	83	1	17	131	139	239
67	41	251	307	313	71	53	11

Fig. 9.

in which 313 is substituted for 293—which also has a total of 8912. These two squares both showing the lowest possible summation of 1114, are given respectively in Figs. 8 and 9.

SQUARES OF THE NINTH ORDER.

The first eighty-one primes, 1 to 409 inclusive, have a total of 15115. To raise this total to the lowest number evenly divisible by 9,

409	389	73	17	383	11	19	13	367
311	67	5	137	43	331	397	31	359
103	241	53	347	139	227	37	283	251
307	149	233	167	337	127	101	109	151
29	263	349	47	197	401	113	211	71
193	61	239	269	173	179	317	191	59
199	157	277	89	271	41	293	97	257
107	353	79	229	131	83	223	313	163
23	1	373	379	7	281	181	433	3

Fig. 10.

the last number of the series (419) must be changed to 433, thus making the total 15129, the ninth part of which is 1681. Magic squares showing this lowest possible summation were made by Messrs. J.

281	181	37	227	271	103	307	233	41
13	293	383	19	241	7	73	263	389
101	137	3	379	47	337	53	373	251
397	5	71	67	353	277	331	149	31
61	409	163	229	127	179	433	1	79
367	59	191	269	347	131	17	193	107
97	23	311	151	157	89	317	313	223
197	173	283	257	109	199	139	113	211
167	401	239	83	29	359	11	43	349

Fig. 11.

N. Muncey and C. D. Shuldham and are given respectively in Figs. 10 and 11.

SQUARE OF THE TENTH ORDER.

The first one hundred primes, 1 to 541 inclusive, sum 24132. To make a total that is evenly divisible by 10 the last number of the

1	3	431	503	17	509	13	443	467	29
409	67	307	89	47	457	43	499	37	461
79	379	83	397	97	367	211	107	347	349
181	569	163	157	167	317	139	137	227	359
277	179	271	193	199	197	401	331	241	127
283	281	191	269	263	257	233	251	149	239
173	293	53	311	313	131	337	223	353	229
419	151	389	59	383	19	487	373	23	113
71	421	7	433	439	61	449	41	463	31
523	79	521	5	491	101	103	11	109	479

Fig. 12.

series (541) must be changed to 569 thus increasing the total to 24160. A magic square showing the lowest possible summation of 2416 was made with the above series by Mr. J. N. Muncey as reproduced in Fig. 12.

SQUARE OF THE ELEVENTH ORDER.

The sum of the first 121 primes, 1 to 661 inclusive, is 36887, which is not evenly divisible by 11. By substituting 677 for 659, the total is raised to 36905, the seventh part of which is 3355. This

1	613	3	587	61	631	107	643	19	653	37
607	73	71	223	619	59	569	47	503	43	541
461	467	83	347	137	499	53	509	149	127	523
457	181	593	173	179	167	491	157	409	151	397
211	353	197	487	227	431	239	419	271	269	251
331	199	337	307	283	293	421	277	389	379	139
317	463	443	67	349	229	373	233	257	241	383
193	313	311	439	433	359	163	367	113	401	263
97	89	449	617	479	103	281	31	557	521	131
79	599	191	101	11	571	17	563	647	547	29
601	5	677	7	577	13	641	109	41	23	661

Fig. 13.

series was arranged in magic formation by Mr. J. N. Muncey, and his square showing the lowest possible summation (3355) is given in Fig. 13.

SQUARE OF THE TWELFTH ORDER.

The sum of the first 144 prime numbers 1 to 827 inclusive, is 54168, the twelfth part of which is 4514. It is worthy of note that this is the only *straight series* of prime numbers of all that have been hitherto considered which is evenly divisible by n, and which is also capable of magic arrangement. Mr. J. N. Muncey has made a magic square of this series, which is shown in Fig. 14.

1	823	821	809	811	797	19	29	313	31	23	37
89	83	211	79	641	631	619	709	617	53	43	739
97	227	103	107	193	557	719	727	607	139	757	281
223	653	499	197	109	113	563	479	173	761	587	157
367	379	521	383	241	467	257	263	269	167	601	599
349	359	353	647	389	331	317	311	409	307	293	449
503	523	233	337	547	397	421	17	401	271	431	433
229	491	373	487	461	251	443	463	137	439	457	283
509	199	73	541	347	191	181	569	577	571	163	593
661	101	643	239	691	701	127	131	179	613	277	151
659	673	677	683	71	67	61	47	53	743	733	41
827	3	7	5	13	11	787	769	773	419	149	751

Fig. 14.

SUMMARY.

ORDER OF SQUARE	TOTALS OF SERIES	LOWEST SUMMATIONS	SQUARES MADE BY
3d	333	111	Henry E. Dudeney (1900)
4th	408	102	Ernest Bergholt and C. D. Shuldham
5th	1065	213	H. A. Sayles
6th	2448	408	C. D. Shuldham, J. N. Muncey
7th	4893	699	" "
8th	8912	1114	" "
9th	15129	1681	" "
10th	24160	2416	J. N. Muncey
11th	36905	3355	"
12th	54168	4514	"

W. S. ANDREWS.
H. A. SAYLES.

SCHENECTADY, N. Y.

GEOMETRIC MAGIC SQUARES AND CUBES.

The term "geometric" has been applied to that class of magic squares wherein the numbers in the different rows, columns, and diagonals being multiplied together give similar products. They are analogous in all respects to arithmetical magic squares.

Any feature produced in an arithmetical square can likewise be produced in a geometric square, the only difference being that the features of the former are shown by summations while those of the latter are shown by products. Where we use an arithmetical series for one, we use a geometric series for the other, and where one is constructed by a method of differences the other is constructed by ratios.

These geometric squares may be considered unattractive because of the large numbers involved, but they are interesting to study, even though the actual squares are not constructed. The absurdity of constructing large geometric squares can be easily shown. For example, suppose we were to construct an 8th order square using the series 2^0, 2^1, 2^2, 2^3,.... 2^{63}, the lowest number would be 1 and the highest number would be 9,223,372,036,854,775,808. Who would be willing to test the accuracy of such a square by multiplying together the numbers in any of its rows or columns?

Analogous to the arithmetical squares the geometric squares may be constructed with a straight geometric series, a broken geometric series, or a series which has no regular progression.

I have divided the methods of construction into four groups, namely: the "Exponential method," the "Exponential La Hirian method," the "Ratio method," and the "Factorial method."

THE EXPONENTIAL METHOD.

The most common way of constructing these squares is with a straight geometric series, arranged in the same order as a straight

7	0	5
2	4	6
3	8	1

Fig. 1.

2^7	2^0	2^5
2^2	2^4	2^6
2^3	2^8	2^1

Fig. 2.

128	1	32
4	16	64
8	256	2

$P = 4096$

Fig. 3.

arithmetical series would be in any summation square. This is equivalent to the following.

Form any magic with a straight arithmetical series as in Fig. 1.

Consider these numbers as exponents by repeating any number (in this case 2) before each of them, which will give us a square as shown in Fig. 2. It may be noticed that 2 is taken 12 times as a factor in each of the rows, columns, and diagonals, therefore forming a geometric square with constant products of 4096. The square transposed in natural numbers is shown in Fig. 3.

4	-3	2
-1	1	3
0	5	-2

Fig. 4.

3^4	3^{-3}	3^2
3^{-1}	3^1	3^3
3^0	3^5	3^{-2}

Fig. 5.

81	$\frac{1}{27}$	9
$\frac{1}{3}$	3	27
1	243	$\frac{1}{3}$

P = 27

Fig. 6.

$3\frac{1}{2}$	0	$2\frac{1}{2}$
1	2	3
$1\frac{1}{2}$	4	$\frac{1}{2}$

Fig. 7.

$4^{\frac{7}{2}}$	4^0	$4^{\frac{5}{2}}$
4^1	4^2	4^3
$4^{\frac{3}{2}}$	4^4	$4^{\frac{1}{2}}$

Fig. 8.

128	1	32
4	16	64
8	256	2

P = 4096

Fig. 9.

Figs. 4, 5, and 6 show the same process involving negative exponents.

Figs. 7, 8 and 9 show how fractional exponents may be used; and the use of both fractional and negative exponents is shown in Figs. 10, 11 and 12.

$2\frac{1}{2}$	-1	$1\frac{1}{2}$
0	1	2
$\frac{1}{2}$	3	$-\frac{1}{2}$

Fig. 10.

$3^{\frac{3}{2}}$	3^{-1}	$3^{\frac{3}{2}}$
3^0	3^1	3^2
$3^{\frac{1}{2}}$	3^3	$3^{-\frac{1}{2}}$

Fig. 11.

$\sqrt{243}$	$\frac{1}{3}$	$\sqrt{27}$
1	3	9
$\sqrt{3}$	27	$\sqrt{\frac{1}{3}}$

P = 27

Fig. 12.

2^{-5}	2^3	2^8	2^{-2}
2^6	2^0	2^1	2^3
2^2	2^4	2^5	2^{-1}
2^7	2^{-3}	2^{-4}	2^{10}

Fig. 13.

$\frac{1}{32}$	512	256	$\frac{1}{4}$
64	1	2	8
4	16	32	$\frac{1}{2}$
128	$\frac{1}{8}$	$\frac{1}{16}$	1024

P = 1024

Fig. 14.

Figs. 13 and 14 show the exponential method applied to a fourth order square. The exponents in Fig. 13 taken alone, obviously form an arithmetical magic.

This square is an associated square,[1] with the products of each complementary pair equaling 32.

THE EXPONENTIAL LA HIRIAN METHOD.

Two primary squares are shown in Figs. 15 and 16. One is filled with the powers 0, 1 and 2 of the factor 2, and the other with the powers 0, 1 and 2 of the factor 5. Each primary square in itself

P = 1000

2^0	2^2	2^1
2^2	2^1	2^0
2^1	2^0	2^2

Fig. 15.

5^1	5^2	5^0
5^0	5^1	5^2
5^2	5^0	5^1

Fig. 16.

5	100	2
4	10	25
50	1	20

Fig. 17.

is a geometric magic with triplicate numbers. Figs. 15 and 16 multiplied together, cell by cell, will produce the magic shown in Fig. 17.

The factor numbers in this case, 2 and 5, are not necessarily different, but when they are alike the exponents must suit the condition, to avoid duplicate numbers in the final square. To make this clearer: if we form two primary squares that will add together and

P = 514944

3^0	3^1	3^2	3^3
3^3	3^2	3^1	3^0
3^1	3^0	3^3	3^2
3^2	3^3	3^0	3^1

Fig. 18.

2^0	2^4	2^2	2^4
2^2	2^4	2^0	2^6
2^4	2^2	2^6	2^0
2^6	2^0	2^4	2^2

Fig. 19.

1	192	36	432
108	144	3	64
48	4	1728	9
596	27	16	12

Fig. 20.

form an arithmetical magic, the same factor number may be added to each of these primary squares, using the former numbers as exponents, and the two will become geometric primary squares that will multiply together and form a geometric magic without duplicate numbers.

Figs. 18, 19 and 20 show the same method applied to the fourth

[1] A square is associated when any two numbers opposite to and equidistant from the center of the square, give a constant product in geometric squares, or a constant sum in arithmetical squares. Such pairs are called complementaries.

order squares. This is a Jaina square, and is consequently pandiagonal and also contains the other Jaina features.[2]

Figs. 21, 22, 23 show the application of a double set of factors to the primary squares. The constants of Fig. 21 are 3×5^3 and those of Fig. 22 are $2^3 \times 7$. This is also a Jaina square.

3^0	5^1	5^2	3^1
3^1	5^2	5^1	3^0
5^1	3^0	3^1	5^2
5^2	3^1	3^0	5^1

Fig. 21.

2^1	2^0	2^2	7^1
2^2	7^1	2^1	2^0
7^1	2^2	2^0	2^1
2^0	2^1	7^1	2^2

Fig. 22.

P = 21000

2	5	100	21
12	175	10	1
35	4	3	50
25	6	7	20

Fig. 23.

THE RATIO METHOD.

If we fill a square with numbers as in Fig. 24, such that the ratios between all horizontally adjacent cells are equal, and the ratios between all vertically adjacent cells are equal, we have a natural square which can be formed into a geometric magic by any of the well-known methods.

The horizontal ratios in Fig. 24 are 2 as represented by the figure at the end of the division line, and the vertical ratios are 3 as indicated, and Fig. 25 shows the magic arrangement of this series.

		2	2
3	1	2	4
3	3	6	12
3	9	18	36

Fig. 24.

18	1	12
4	6	9
3	36	2

P = 216

Fig. 25.

In a fourth order square, as in Fig. 26, the horizontal ratios are not necessarily equal, and neither are the vertical ratios. A magic may be made from this natural square by forming the numbers in the upper row into a primary square as in Fig. 27. The numbers in the left-hand column are then formed into another pri-

[2] See reference to the Jaina Square in *Magic Squares and Cubes* by W. S. Andrews.

mary square as in Fig. 28. These two primary squares will then produce the magic shown in Fig. 29.

P = 7560

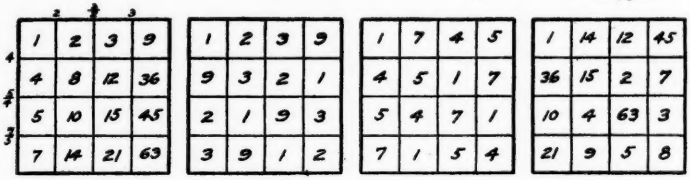


Fig. 26. Fig. 27. Fig. 28. Fig. 29.

Fig. 30 is a balanced natural square. This series will produce a perfect Jaina, a Nasik,[3] or an associated square. Figs. 31, 32 and 33 show it arranged in a Nasik formation.

P = 14400

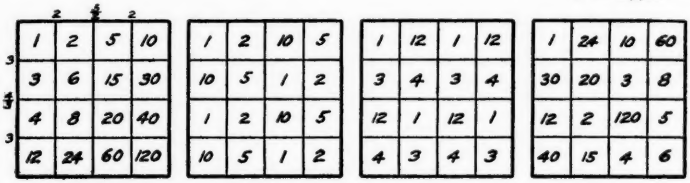
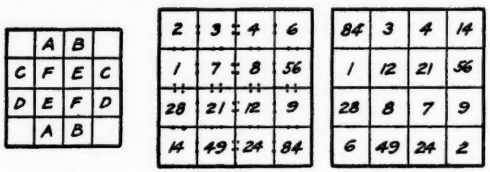


Fig. 30. Fig. 31. Fig. 32. Fig. 33.

Mr. L. S. Frierson's arithmetical equation squares also have their geometric brothers. Where he applies the equation $a - b = c - d$, we use the proportion $a : b :: c : d$. Fig. 35 shows a natural



P = 14112

Fig. 34. Fig. 35. Fig. 36.

equation square, and besides the proportions there shown, the diagonals of the magic depend on the necessary proportion $a : b :: c : d$ as indicated in the respective cells of Fig. 36*a*.

The magic is then formed by revolving the diagonals 180° as is shown in Fig. 36, or by interchanging the numbers represented by like letters in Fig. 34.

Another form of natural equation square is shown in Fig. 38.

[3] A concise description of Nasik Squares is given in *Enc. Brit.*

The diagonals in this square depend on the equation $a \times b = c \times d$ (see Fig. 36*b*). The magic is made by interchanging the numbers

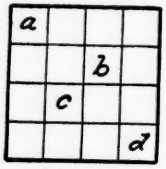


Fig. 36*a*.

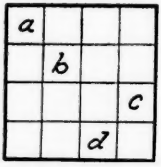


Fig. 36*b*.

represented by like letters in Fig. 37, producing Fig. 39 and then adjusting to bring the numbers represented by the A's and D's in

P = 11760

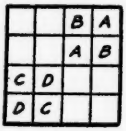


Fig. 37.

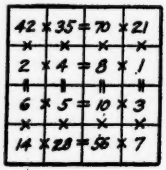


Fig. 38.

42	35	1	8
2	4	21	70
28	14	10	3
5	6	56	7

Fig. 39.

6	56	7	5
35	1	8	42
4	21	70	2
14	10	3	28

Fig. 40.

Fig. 37, in one diagonal and the numbers represented by the B's and C's in the other diagonal, or in other words, shifting the left-hand column of Fig. 39 so as to make it the right-hand column,

1	2	3	4	5
6	12	18	24	30
7	14	21	28	35
11	22	33	44	55
13	26	39	52	65

Fig. 41.

P = 720720

1	2	3	4	5
3	4	5	1	2
5	1	2	3	4
2	3	4	5	1
4	5	1	2	3

Fig. 42.

1	7	13	6	11
6	11	1	7	13
7	13	6	11	1
11	1	7	13	6
13	6	11	1	7

Fig. 43.

1	14	33	24	55
18	44	5	7	26
35	13	12	33	4
22	3	28	65	6
52	30	11	2	21

Fig. 44.

and then shifting the bottom line of the square thus formed to the top. The result of these changes is shown in Fig. 40.

Fig. 41 is a fifth order natural square, and Figs. 42, 43 and 44 clearly show the method of forming the magic, which is pan-diagonal.

In the same manner Dr. Planck constructed his arithmetical Nasik squares[4] of orders $4m + 2$, we can likewise construct geometric squares.

Fig. 45 shows a natural 7×7 square with the central row and column cast out. This is formed by path method into the Nasik

$P > 22 \times 10^{42}$

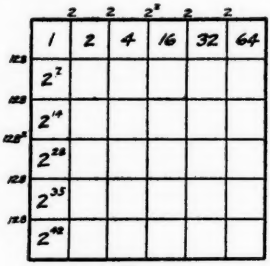


Fig. 45.

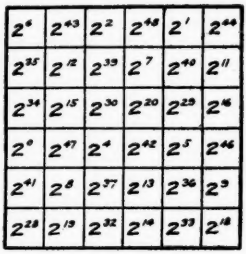


Fig. 46.

square, rearranging the columns in this order 1, 4, 32, 64, 16, 2 and the rows in this order 1, 2^7, 2^{28}, 2^{42}, 2^{35}, 2^{14} and using advance move 2, 3 and a break move -1, -1.

THE FACTORIAL METHOD.

In this method we fill two primary squares, each with n sets of any n different numbers, such that each row, column, and diagonal contains each of the n different numbers.

To avoid duplicates in the magic, the primary squares should have only one number in common, or they may not have any number in common. Also, no two numbers in one primary square should have the same ratio as two numbers in the other primary square.

This may be more clearly explained by an example. Suppose we select two sets of numbers as follows for constructing a fourth order square.

1 2 4 7
1 3 5 6

Four sets of the upper row of numbers are to fill one primary

[4] See article by Messrs. Andrews and Frierson in *The Monist,* Vol. XXII, No. 2.

square and four sets of the lower row are to fill the other. These two groups contain only one number in common, but the magic would contain duplicate numbers due to the duplicate ratios 2:4 as 3:6. Therefore $2 \times 6 = 4 \times 3$, consequently the duplicate numbers would be 12. But if we interchange the numbers 2 and 5, the fault will be corrected and the square can then be constructed without duplicate numbers.

The square in Fig. 47 is constructed with the two groups

1 2 3 4
1 5 6 7

P = 5040

1	15	24	14
12	28	3	5
21	6	10	4
20	2	7	18

Fig. 47.

P = 362880

1	10	21	32	54
28	48	9	2	15
18	3	20	42	8
30	7	16	27	4
24	36	6	5	14

Fig. 48.

A fifth order square is shown in Fig. 48 and in this case the following groups are used:

1 2 3 4 6
1 5 7 8 9

This square is pan-diagonally magic.

I will now show how a Nasik sixth order square may be made by a method derived from Dr. Planck's method of constructing Nasik squares with arithmetical series.

Fill two six-celled rectangles, each with six different numbers, the two rectangles to have no more than one number in common.

1	32	16
64	2	4

Fig. 49.

1	243	81
729	3	9

Fig. 50

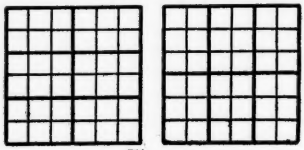


Fig. 51

The numbers in each rectangle should be arranged so that the products of its horizontal rows are equal, and the products of its vertical rows are equal.

Two of such sets of numbers that will suit the above conditions will not be found so readily as in Dr. Planck's examples above mentioned.

The two sets forming the magic rectangles in Figs. 49 and 50 are taken from the following groups:

$$2^0 \quad 2^1 \quad 2^2 \quad 2^3 \quad 2^4 \quad 2^5 \quad 2^6$$
$$3^0 \quad 3^1 \quad 3^2 \quad 3^3 \quad 3^4 \quad 3^5 \quad 3^6$$

Each group is a geometrical series of seven numbers, and in forming the rectangle, the central number in each group is omitted.

The rectangles are arranged in primary squares as shown in Fig. 51, and the two rectangles in Figs. 49 and 50 so arranged will produce the square in Fig. 52. This square is pandiagonal, 2^2-ply and 3^2-ply.[5]

P = 101,559,956,668,416.

729	192	9	46656	3	576
32	486	2592	2	7776	162
11664	12	144	2916	48	36
1	15552	81	64	243	5184
23328	6	288	1458	96	18
16	972	1296	4	3888	324

Fig. 52.

GEOMETRIC MAGIC CUBES.

I will here briefly describe the analogy between the series which may be used in constructing cubes, and those used in constructing squares.

It is obvious that an unbroken geometric series of any sort may be arranged in a cube of any order, by placing the numbers in the cube in the same progression as the numbers of an arithmetical series would be placed in forming an arithmetical cube. This may be accomplished by an extension of the method exemplified in Figs. 1 to 14 inclusive.

1	2	4	3	6	12	9	18	36
5	10	20	15	30	60	45	90	180
25	50	100	75	150	300	225	450	900

Fig. 53.

In using the Exponential La Hirian method, the same process is followed in cubes as in squares, the main difference being that three primary cubes are necessarily used.

Fig. 53 shows a natural cubic series, obtained by the Ratio

[5] A square is said to be m^2-ply when the numbers in any m^2 group of contiguous cells give a constant product in geometric squares, or a constant sum in arithmetical squares.

method. The three squares represent the three planes of the cube. The numbers 5 at the left of the first square represent the ratio between vertically adjacent cells in each of the planes. The numbers 2 above represent the ratio between horizontally adjacent cells in each of the planes, and the numbers 3 between the squares represent the ratio between adjacent cells from plane to plane.

By rearranging this series into a cube according to the path methods as in arithmetical cubes,[6] many results may be obtained, one of which is shown in Fig. 54.

A fourth order balanced or associated series is shown in Fig. 55. This series is analogous to the plane series in Fig. 30, and may

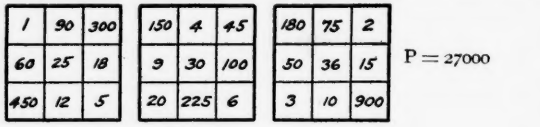


Fig. 54.

be transformed into a magic cube by the following well-known method:

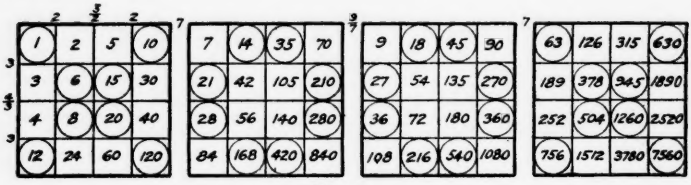


Fig. 55.

Interchange the numbers in all associated pairs of cells which are inclosed in circles, producing the result shown in Fig. 56.

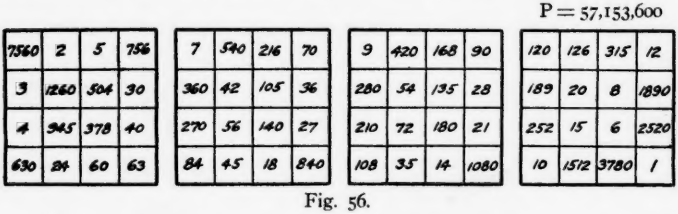


Fig. 56.

The possibilities in using the Factorial method in constructing cubes, has not been investigated by the writer.

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[6] See *Magic Squares and Cubes* by W. S. Andrews.